ABSTRACT
              The purpose of this study was to determine if there
was a significant difference in the readability of three collections
of reading textbooks adopted for use in California for four student
groups--culturally disadvantaged, slow, average, and fast. The Botel
readability formula was applied to nine, 100-word samples taken from
a total of twenty-four textbooks. The sign test for significant
differences was applied in an inter-book comparison of readability
levels of each of the nine samples across the three collections. The
interquartile range was calculated for each of the nine, 100-word
samples taken from the twenty-four textbooks. The findings indicated
that readability levels of textbooks for culturally disadvantaged
students were significantly lower than readability levels of
textbooks for slow and average students in grades one, two, and
three; for slow and average students were significantly higher than
textbooks adopted for fast students in grades one, two and three; and
for fifth grade culturally disadvantaged and slow students were
significantly lower than the readability level of the textbook
adopted for the fast students. Textbooks adopted for fast students
achieved the best publisher's grade assignment--readability level,
match. (WR)

ED 094364

A STUDY OF THE READABILITY OF READING TEXTBOOKS ADOPTED
FOR USE IN CALIFORNIA ELEMENTARY SCHOOLS

By

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The Requirements for the Degree of
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Walden · University
July, 1974

ACKNOWLEDGMENTS

I wish to acknowledge the very substantive help

given to me by my advisor, Dr. Shirley B. Finnegan. Her

constructive suggestions with regard to appropriate content

helped me sharpen the focus of this paper. Her relationship

as a working colleague for the past twelve years validated

her suggestions and insights as my advisor.

Dr. Bud Warren of the Educational Testing Service,

Berkeley, California, assisted me with the research design;

his direction was indispensable when the time arrived to

analyze the data.

I owe special thanks to the two members of my

Dissertation Committee: Dr. Morton Botel of the University

of Pennsylvania, Philadelphia, Pennsylvania, and Dr. Patrick

A. O'Donnell of San Francisco State University, San Fran-

cisco, California. I am most appreciative of the fact that

Dr. Botel agreed to read my paper; his authorship of the

readability instrument used in this study presented him as

the person best qualified to judge the appropriateness of

its application. Dr. O'Donnell's comments added strength

to the content of this paper.

Dr. Bob L. Blancett of Walden University, Naples,

Florida, answered numerous procedural questions related to

the completion of this paper. I have appreciated his help.

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CHAPTER I

THE PROBLEM, DEFINITIONS, AND LIMITATIONS

Introduction

In 1969 new textbooks in reading and literature were
implemented in the elementary schools of California. The
textbooks were adopted and implemented after a period of
three years of careful planning. The first steps in plan-
ning began in the spring of 1966 when experts in reading from
California colleges and universities convened to consider the
criteria for a new reading adoption. By early 1967 criteria
were approved by the State Board of Education. According to
the criteria, the adopted reading program should: (1) build
positive attitudes, (2) develop efficient reading skills and
lifelong habits of reading critically and creatively, (3)
bridge cultures and divergent socioeconomic segments, (4)
provide for a wide span of abilities, (5) provide for the
diagnosis and correction of reading disabilities and for the
evaluation of student progress, (6) possess a scope and se-
quence of all reading skills in a balanced program (103:46).

Point (3) above was included in the criteria because
the State recognized the student population of California
schools was composed of children from many backgrounds; the
student population came from different racial, ethnic,

1

cultural, and socioeconomic backgrounds. Figures for racial
and ethnic groups in 1966 appear in the State's justifica-
tion Statement and are reported below in Table 1 (103:7).

TABLE 1

ENROLLMENT IN CALIFORNIA ELEMENTARY SCHOOLS,
BY RACIAL AND ETHNIC GROUPS, FALL 1966.

	Number	Percent
Spanish Surname	380,909	13.99
Other White	2,046,800	75.20
Negro	214,126	7.80
Chinese, Japanese, Korean	53,713	1.97
American Indian	7,976	.29
Other Nonwhite	18,101	.66
Total	2,721,625	99.91

From this data the State concluded it had a student
population that ranged widely in learning rates, learning
styles, ability to understand and express themselves in Eng-
lish, and in reading interests (103:6-8). The State further
concluded that reading textbooks should be adopted to accom-
modate this diverse student population. Thus, Section 9311
of the Education Code was enacted into law by the Legislature
to accomplish that purpose; for it required the adoption of
more than one basic textbook (105:586).

Socioeconomic data were not stated for the groups in
Table 1, or in any part of the justification Statement (103).
Instead, 15 per cent of the population in Table 1 was
labeled "culturally disadvantaged" by the State Office of
Compensatory Education (103:9). The culturally disadvantaged
and three additional student groups were identified and
described in the four paragraphs that follow. Reading

textbooks were then adopted for the four groups of students

described below:

Culturally Disadvantaged Group

Pupils whose score on the most recent reading test
does not come up to the expectancy level determined
by teacher judgment based on performance in the class-
room and/or other test scores available, and who, in
the opinion of the teacher, have such low reading
achievement because of economic, cultural, social,
or language backgrounds and resultant language dis-
abilities or other disabilities, are in the cultur-
ally disadvantaged group. Pupils who did not take
such a test within the year, but who in the opin-
ion of the teacher indicate by their classroom per-
formance that they fall in the culturally disadvan-
taged group, will be considered to be within the cul-
turally disadvantaged group. Fifteen percent of the
pupils in kindergarten and in each grade of grade one
through grade eight are assumed to be culturally dis-
advantaged. (This assumption is based upon survey
figures supplied by the Office of Compensatory Edu-
cation.)

Lower Group (Slow)

Pupils who scored at or below the 25th percentile
on the most recent reading test used in the state
testing program and such other pupils as did not take
such a test within one year of the use of the text-
book by the pupil but who, in the opinion of the
teachers, would, if given such a test, achieve a
score within this percentile range, are within the
lower group.

Middle Group (Average)

Pupils who scored from the 26th to the 75th per-
centiles on the most recent reading test used in the
state testing program and such other pupils as did
not take such a test within one year of the use of
the textbook by the pupils but who, in the opinion
of the teachers, would, if given such a test, achieve
a score within this percentile range, are within the
middle group.

<u>Upper Group</u> (Fast)

Pupils who scored above the 75th percentile on the most recent reading test used in the state testing program and such other pupils as did not take such a test within one year of the use of the textbooks by the pupils but who, in the opinion of the teachers, would, if given such a test, achieve a score within those percentiles, are within the upper group (103:9-10).

The months from June 1967, to May 1968, were a period of examination and evaluation of reading textbooks, and followed the formulation of criteria and the description of groups of students. Examination and evaluation required the efforts of approximately 40,000 persons distributed throughout the State. Personnel included teachers, administrators, curriculum workers and supervisors, college and university professors, librarians, college students, laymen, and others (103:5). In May 1968, the Curriculum Commission for the State of California (and coordinating body for the adoption procedures) made its recommendations to the State Board of Education (103:1-46).

Statement of the Problem

From June 1967, to May 1968, the contents of each reading textbook series, submitted for adoption by publishers, were examined and evaluated according to nine categories titled: (1) readiness, (2) word attack skills, (3) vocabulary, (4) comprehension, (5) reading in the content

fields, (6) fine literature, (7) balanced program, (8) evaluation measures, (9) teacher's editions (103:13-27).

Four textbook series, shown in Table 2 on the next page, were recommended for adoption in the final selection process (104:6-13). Those series and the groups of students they were to serve were as follows:

The Bank Street Readers, published by the Macmillan Company, were adopted for grades one through three and were deemed appropriate for culturally disadvantaged students (1).

The Open Highways Readers, published by Scott, Foresman and Company, were .dopted for grades four through six and were deemed appropriate for slow and culturally disadvantaged students (16).

The Harper and Row Basic Reading Program, published by Harper and Row, Publishers, Incorporated, was adopted for grades one through six and was deemed appropriate for average and slow students in grades one through three and also appropriate for average students in grades four through six (14).

The Macmillan Reading Program, published by the Macmillan Company, was adopted for grades one through six and was deemed appropriate for fast students (12).

All of the textbook series were described in the justification Statement (103) by employing the nine

TABLE 2

READING TEXTBOOKS ADOPTED BY THE STATE OF CALIFORNIA BEGINNING WITH THE 1969-70 SCHOOL YEAR FOR CULTURALLY DISADVANTAGED (CD), SLOW (S), AVERAGE (A), AND FAST (F) STUDENT GROUPS

Publisher's Grade Assignment		Bank Street (CD)	Harper & Row (S&A)	Macmillan (F)
1	(1^2) (1^3)	Uptown, Downtown	Real and Make Believe / From Elephants to Eskimos	Lands of Pleasure
2	(2^1) (2^2)	My City / Green Light Go	All Through the Year / From Fins to Feathers	Enchanted Gates / Shining Bridges
3	(3^1) (3^2)	City Sidewalks / Round the Corner / Scott, Frsmn. (CD&S)	From Far Away Places / From Bicycles to Boomerangs (A)	Better Than Gold / More Than Words
4	(4^1) (4^2)	Open Highways, Bk. 4	Trade Winds / From Codes to Captains	The Magic Word
5	(5^1) (5^2)	Open Highways, Bk. 5	Crossroads / From Actors to Astronauts	Bold Journeys
6	(6^1) (6^2)	Open Highways, Bk. 6	Seven Seas / From Coins to Kings	Into New Worlds

PUBLISHER AND TITLE

categories enumerated above. One of those categories, namely

vocabulary, described the degree of vocabulary control within

each of the series and the extent to which vocabulary cor-

related with the listening and speaking vocabularies of ele-

mentary school students. Descriptions of vocabulary usage

were made in general and subjective, rather than in specific

and objective terms; the statements were as follows:

Bank Street Readers (Culturally Disadvantaged) (1)

Vocabulary: The vocabulary is based on the content used in the materials and on real-life experiences outlined in the program. This approach allows the teacher to broaden and expand the child's use of words.
These readers take into account the language dif-ficulties of the disadvantaged. In its recent re-port, Language Arts Programs for the Disadvantaged,[1] The National Council of Teachers of English recom-mends greater stress on oral language for the dis-advantaged child at all levels of instruction. Rec-ognizing that these children often come to school with limited exposure to the words and concepts many children learn at pre-school age, the Bank Street program emphasizes at its earliest levels extended language experience activities in order to help children gain facility in oral language as well as to develop in them an understanding of the relation-ship between written and spoken words (103:24).

Open Highways Readers (Slow and Culturally Disadvan-taged) (16)

Vocabulary: Emphasis is placed on building lan-guage through vocabulary familiar to the child and from his experiences. Shades of meaning are empha-sized and facility with oral language patterns. In

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[1]National Council of Teachers of English, Report of the National Council of Teachers of English Task Force on Teaching English to the Disadvantaged, Language Programs for the Disadvantaged, 1965, p. 272.

the beginning of the program sentences are short and
direct but increase in complexity as the child pro-
gresses. Dictionary sections and glossary sections
provide opportunities for expanding and developing
vocabulary (103:26).

Harper and Row Basic Reading Program (Average and Slow) (14)

Vocabulary: The first grade vocabulary in the
Harper and Row readers has been greatly expanded over
basic reading programs now in use. Yet this expan-
sion has been accomplished without the use of mean-
ingless word lists, or the use of words which are
phonetically regular and simple but which are complex
in their meanings and associations. Meaning, includ-
ing multiple meaning, is stressed just as much as
word pronunciation or decoding. The vocabulary in
both Strands I and II reflects current research and
scholarly thinking in the field of reading. In the
fifth grade reader all vocabulary controls are drop-
ped and the student is encouraged to expand and en-
rich his knowledge of words (103:17-18).

Macmillan Reading Program (Fast) (12)

Vocabulary: Vocabulary in this series is unre-
stricted and an effort has been made to include words
from the listening and speaking vocabulary of most
children. Unusual words have been used for immediate
interest and utility and additional words selected to
demonstrate phonetic or structural principles (103:21).

In September 1973, a letter of inquiry was mailed by

this writer to each of the three publishers of the four

adopted series. The purpose of each was to discover which

readability formulae, if any, had been applied in the writ-

ing of the textbooks. If no formulae had been applied, the

publishers were asked to explain on what bases grade levels

had been assigned to the textbooks (Appendixes I, II, III).

Letters of reply were received from all three publishers.

Harper and Row Publishers took the position that most readability formulae were unsuitable for non-textbook materials and for reading textbooks; vocabulary introduced in the Harper and Row (14) textbooks, although considered "unfamiliar" by some readability formulae, becomes familiar through carefully planned teaching. The bases for assignment of grade levels to textbooks were: interest, story excitement, familiarity of situations, clarity of concepts, simplicity of syntax, and familiarity of vocabulary (Appendix IV).

Macmillan Publishing Company referred to the vocabulary lists and work done in reading by Dr. Albert J. Harris and to the readability formulae of Dale-Chall (36) and Spache (83); the content of that letter was nonspecific when referring to the works of Dr. Harris, and inaccurate when referring to the formulae of Dale-Chall and Spache (Appendix V). However, one can infer that the two formulae were applied, as appropriate: the Dale-Chall to an unspecified number of intermediate-grade textbooks, and the Spache to all primary-grade textbooks.

Scott, Foresman and Company explained that each selection had been placed in a book on the basis of suitability. Suitability was judged according to: readability rating by the Dale-Chall (36) or the Spache (83) formulae, difficult words, level of interest, background required for

interpretation, maturity of concepts, literary form, author's style, paragraph length, new vocabulary, and connectives used (Appendix VI).

In summary, this writer has attempted to show that the justification Statement (103) did not include readability ratings traditionally derived by applying objective formulae to textbook passages. This writer has also summarized information, recently supplied to him, about readability formulae and other readability factors weighed by publishers when they composed the textbooks analyzed in this study. It is important to state here that none of this information was volunteered to this writer or other committee members in 1968, for at that time this writer was a member of a committee to evaluate textbooks for the State of California. Committee members were teachers employed by the Berkeley Unified School District, Berkeley, California. In retrospect, the omission from the justification Statement (103) and from the publishers were gross and startling since readability formulae remain, to this day, one important source for measuring textbook difficulty. Thus, in 1968 readability data were not available to evaluate reading materials being selected for a heterogeneous population of nearly three million students.

Briefly stated then: the purpose of this study is

to determine if there is a significant difference in the

readability of reading textbooks adopted by the State of Cal-

ifornia for four student groups in grades one through six:

the culturally disadvantaged, the slow, the average, and the

fast. A further purpose is to recommend procedures teachers

should follow when assigning reading textbooks to students

on the basis of readability data.

Need for this Study

After reading the vocabulary sections in the justi-

fication Statement this writer concluded that the evaluation

of vocabulary in the four series of textbooks had been ex-

pressed in highly subjective and general terms (103:17-18,

21, 24, 26). The description of vocabulary used in the Bank

Street Readers (1) and in the Open Highways Readers (16) led

this writer to expect that text descriptive of real-life ex-

periences and utilizing the syntax of spoken language would

deviate significantly from the syntax in other reading text-

books; thus, vocabulary would differ measurably from other

textbooks. The description of vocabulary used in the Harper

and Row (14) textbooks led this writer to anticipate that an

expanded vocabulary for grades one through three, and an

elimination of vocabulary controls at grade five, would yield

textbooks more difficult than the grade assigned them by the

publisher; thus, perhaps the textbooks would be even more difficult than the Bank Street Readers and Open Highways Readers. And last, this writer should anticipate that the Macmillan (12) textbooks, adopted for the fast group, would be significantly more difficult than the other three series because vocabulary controls had been eliminated for all textbooks in that series. In general, this writer anticipated that the readability levels of the four series of textbooks would be higher than the grade levels assigned by their publishers. Other important, but as yet unknown, differences were also expected to emerge from among the four series of textbooks. The above inferences are to be verified in this study by securing answers to the following five questions:

Is there a significant difference in the readability levels of three collections of reading textbooks adopted by the State of California for culturally disadvantaged, slow, average, and fast students?

Is there a gradual increase in the readability levels within each of the three collections of textbooks, starting with textbooks for grade one and continuing through textbooks for grade six?

When nine, 100-word samples are drawn from each text-book, will the readability levels of the samples increase

gradually, starting with the first sample and ending with

the ninth sample?

Does the range of readability levels of samples

drawn from textbooks vary from book-to-book within each of

the three collections of textbooks, starting with the text-

book for grade one and continuing through the textbook for

grade six?

Is there a difference in the range of readability

levels of samples drawn from the three collections of text-

books, starting with a comparison of all textbooks for grade

one and continuing through all textbooks for grade six?

Hypothesis

The first question in the preceding section has been

restated in the form of the null hypothesis to be tested in

this study: There will be no significant difference found

in the readability levels of three collections of reading

textbooks adopted by the State of California for four student

groups (culturally disadvantaged, slow, average, and fast).

Readability levels are to be measured with the Botel (2)

formula. The remaining four questions will be answered

through descriptive analyses of the data within the frame-

work of the descriptive/statistical design of this study.

Definition of Terms

For the purpose of this study the following defini-
tions of terms have been adopted:

Textbook:	a book used in the study of reading.
Textbook series:	a group of books written for reading instruction by one publisher and desig- nated for a range of school grades.
Three collections:	four textbook series organ- ized for four student categories: culturally disadvantaged, slow, average, and fast.
Readability level:	a statement of comparison of vocabulary contained in reading material with vo- cabulary contained in a selected word list.

Limitations

All generalizations made from this study must ob-
serve the following parameters circumscribed by the design
and content of this study: (1) vocabulary is the sole
variable utilized in the determination of readability level,
and (2) the Botel (2) formula may be inappropriate for
measuring the readability levels of textbooks other than
textbooks for reading instruction.

Summary

Adoption procedures and adoption criteria have been described in this chapter. The problem has been described, and questions have been posed which require answers.

Literature related to the topic of readability will be reviewed in the next chapter.

CHAPTER II

REVIEW OF THE LITERATURE

Readability Defined

An initial discussion of the topic, readability,
with a group of teachers or laymen has the possibility of
eliciting three categories of responses. Some persons in
the group may launch into a discussion about the legibility
of handwriting or typography as their perception of the com-
ponents of readability. Other persons in the group may dis-
agree and state that legibility is not so important as the
interest-value of what is being read. Still, other persons
in the group may point up the importance of ease of under-
standing (comprehension) due to style of writing. It is not
the intent in this chapter to attempt to maintain the sharp
lines drawn by members of the imaginary group, above; in-
stead, the intent is to establish a broader frame of ref-
erence as a point of departure for this study. That frame
of reference is to be found in the definition of readability
by Gilliland. He defined readability in terms of matching
the reader with materials:

> Readability is primarily concerned with a basic prob-
> lem familiar to all people who choose books for

16

their own use or who choose books for others to use. This is a problem of matching. On the one hand there is a collection of individuals with given interests and reading skills. On the other hand, there is a range of books and other reading materials, differing widely in content, style and complexity. The extent to which the books can be read with profit will be determined largely by the way in which the two sides are matched. For example, a person who is a competent reader may soon be deterred from reading if his choice is restricted to simple repetitive texts. Similarly, a person with limited reading ability may soon become discouraged if he is given texts which are beyond his comprehension. . . . The study of this problem of matching reader and text has come to be called 'readability' (9:12).

A widely quoted definition by Dale and Chall is probably also useful for this study even though it appears narrower in scope, less specific in detail (and therefore less practical for application); nevertheless, its value continues:

In the broadest sense, readability is the sum total (including interactions) of all those elements within a given piece of printed material that affects the success a group of readers have with it. The success is the extent to which they understand it, read it at an optimum speed, and find it interesting (37:23).

Earliest Concerns

Early religious writings evidenced an interest in readability (or its parallel, listenability). Advocates of clear language made their point in I Corinthians 14:9, "Except ye utter by the tongue words easy to be understood, how shall it be known what is spoken? For ye shall speak into

the air." First recorded attempts to examine readability
were made by religious teachers, the Talmudists, in 900 A.D.
They counted words and ideas to determine frequency of occur-
rence; from this they could distinguish the usual from the
unusual meanings and divide the reading of the Torah into
weekly portions of approximately equivalent comprehension
units (64:544).

In this century William S. Gray, as reported by
Klare, explained that vocabulary was considered a factor in
the ease of understanding when McGuffey Readers were ana-
lyzed in 1840 and graded from easiest to hardest (57:14).
F. W. Kaeding, a German, constructed a word count in 1898,
provided a more scientific base for relating vocabulary to
reading difficulty, and established the first vocabulary
list (64:545). Then in 1921 Thorndike tabulated the fre-
quency with which words occur in print and published The
Teacher's Word Book (18). That publication influenced the
teaching of vocabulary in schools; later it also served as a
basis for measuring readability in the first readability for-
mulae.

Formulae Emerge

The term "readability formula" will be used in this
study to refer to a " . . . method of measurement intended

as a predictive device (13:13)." " . . . a readability for-
mula is a method of estimating the probable success a reader
will have in reading and understanding a piece of writing
(13:34)." The years of 1923 to 1934 were a period of the de-
velopment of the first readability formulae in the United
States.

The first readability formula evolved in 1923 when
Lively and Pressey sought to discover the comparative vocab-
ulary burden in textbooks, and also sought to measure the
vocabulary difficulty in supplementary reading material.
They sampled one-thousand-word passages and tabulated the
number of different words in the sample and their frequency
of occurrence. Then they assigned value to each word as
given in Thorndike's Teacher's Word Book (18) and deter-
mined words not appearing in that book. Thus they developed
a formula for determining readability (62).

The Lively and Pressey effort was followed by a
large study of the reading preferences of 37,000 students by
Vogel and Washburne. Reading preferences were matched with
scores on a reading achievement test. The median reading
grade scores were computed on 152 preferred books and were
then used as a grade level rating for each of the books.
These grade level ratings were then correlated with scores
from the Lively-Pressey (62) formula. A correlation

coefficient of .80 was obtained. The work of Vogel and

Washburne was significant not only because it was the first

validation study of a formula element using outside crite-

rion, but it also provided a base for these authors to con-

struct a new readability formula (89). Klare observed:

> Their technique, . . . , is of special interest be-
> cause it represents the prototype of modern read-
> ability formulas.
> . . . . , ...
> This formula is of particular importance because,
> in addition to its modern appearance, it yielded
> scores that correlated .845 with the reading test
> scores of the children who read and liked the crite-
> rion books (13:39).

Dolch (40), Lewerenz (60, 61), Johnson (54), Bear

(95), Patty and Painter (74), and Thorndike (88), were some

of the other investigators involved in readability research

during this eleven-year period; readability research relied

heavily upon vocabulary variables for predicting readability,

upon Thorndike's Teacher's Word Book (18) as a basis of

vocabulary difficulty, and upon the use of relatively crude

criteria of reading difficulty, including polysyllabic word

count and weighted-word formulae. Only minimal efforts were

made to validate results (13:44).

The next period from 1934 to 1938 was marked by a

diminished reliance on vocabulary lists like Thorndike's

(18); in its stead, an interest emerged in variables such as

sentence length and complexity, qualitative aspects of

vocabulary usage, and variety in parts of speech represented in a passage. Interest shifted to the development of readability formulae applicable to adult reading materials (13: 44-51). Noteworthy examples of researchers during this period are Ojemann (72), Dale and Tyler (38), McClusky (66), Gray and Leary (49), and Morriss and Halverson (102). An era of the so-called, efficient formulae, followed.

The period from 1938 to 1969 witnessed a shift in emphases in so-called, formula-making (13:51-81). The shift was from the complex to the simple and more efficient. This was perhaps a natural reaction after some fourteen years of experience with formulae that appeared to increase in complexity with the passage of time and with mounting research evidence. Thus, during the three decades that followed, readability formulae became more efficient by reducing the number of variables in them. Some of the older formulae currently in use, and more recent formulae, have been charted in Table 3 on the next page. The most recently developed formulae, by Fry (45) and McLaughlin (68), have stressed efficiency, that is, ease of calculation and savings of time. Pauk estimated the calculation time for the McLaughlin formula to be about ten minutes and fifteen minutes for the Fry formula (75:207).

During the same thirty-year period there was another

TABLE 3

SELECTED READABILITY FORMULAE DEVELOPED
DURING THE YEARS: 1938-1969

Author/Year	Range of Difficulty (Grade)	Variables
Lorge, 1939 (63)	3-12	Sentence length Prepositional phrase "Hard" words

Flesch, 1948 (44)	3-12	"Reading Ease"
		  Sentence length
		  Syllable count
		"Human Interest"
		  Personal words
		  Personal sentences

Dale and Chall, 1948 (36)	3-12	Sentence length "Hard" words
Yoakam, 1951 (94)	2-14	"Hard" words
Farr, Jenkins, and Paterson, 1951 (43)	Adult	Monosyllables Sentence length
Gunning, 1952 (10)	6-12	"Fog Index" Sentence length Polysyllables
Spache, 1953 (83)	1-3	Sentence length "Hard" words
Botel, 1962 (2)	1-12	"Hard" words
Fry, 1968 (45)	1-Col.	Sentence length Syllable count
Elley, 1969 (41)	Age: 7-14+	Noun frequency count
McLaughlin, 1969 (68)	7+	"SMOG" Polysyllables

trend, namely, to develop formulae for limited areas (13:66):

for example, the Spache (83) for grades one to three, the

Dale-Chall (36) for grades four and above, the Flesch (7)

and Bloomer (24) for assessment of levels of abstraction, and the Botel (2) for vocabulary common to textbooks designed to teach children how to read. The suitability of formulae for limited areas was validated in 1973 by Felsenthal in a study designed to compare readability estimates of four formulae by utilizing a computer. The Spache was concluded to be best for primary grades, the Lorge (63) for junior high school, the Fry (45) for high school, and the Flesch "Reading Ease" (44) had the broadest range of coverage (96:9).

Since 1963 there has been a steady increase in the use of computers in readability research. In 1963 Danielson and Bryan derived a new formula through computer use (39). In 1970 Klare, and others, computerized the Flesch "Reading Ease" formula (58); Jacobson and MacDougall fused readability variables and programmed instruction units (51). In 1973 Moe and Arnold ascertained the readability of Newbery Award Books through computer use (101); and Harris developed a new readability formula utilizing a computer (99).

Cloze Procedure

In 1966 Bormuth criticized the quality of readability formulae. He stated:

It is problematic whether presently available

readability formulas help more than they hinder.
Because these formulas are easy and inexpensive to
apply they enjoy widespread use by publishers and
educators (27:81).

Three years earlier in 1963 Bormuth wrote passages at three

different readability levels as computed with the Dale-Chall

(36) formula. A cloze test on each passage was given to

children in grades four, five, and six. Bormuth concluded

that the cloze procedure was a measure of readability, and

that cloze tests were valid and reliable predictors of com-

prehension (25:134). Gallant (47), and others, later veri-

fied those conclusions.

The cloze procedure (or technique) had been devel-

oped ten years earlier by Taylor in 1953. The term, "cloze,"

was derived from the term, "closure." Taylor explained:

> The . . . term is one Gestalt psychology applies to
> the human tendency to complete a familiar but not-
> quite-finished-pattern to 'see' a broken circle as
> a whole one . . . by mentally closing up the gaps
> (87:415).

When the closure theory is applied in reading to measure com-

prehension (and some would say readability), it involves the

random or pattern deletion of words from printed passages.

As Lamb described it --

> Subjects are asked to fill in the blanks with the
> exact word deleted. The difficulty rating for a
> passage is determined by counting the number and com-
> puting the percentage of blanks filled in with pre-
> cisely the same word used by the original writer
> (100:6).

In his 1953 study Taylor compared cloze test results with the Dale-Chall (36) and the Flesch "Reading Ease" (44) formulae. He found that cloze scores ranked three passages in much the same order of readability as did the two formulae. He applied the cloze procedure to works of Gertrude Stein and James Joyce. The cloze scores indicated the passages were very difficult. By contrast, the two formulae ra* ed the passages as easy (87:433).

Bormuth (25) followed up his 1963 study with two additional investigations; his purpose was to establish scores for multiple-choice questions, and scores for word accuracy and comprehension (on an oral reading test) that would be comparable to scores on cloze tests. Thus, in a 1967 investigation of cloze--multiple choice comparability, he concluded that cloze scores of 38 and 50 per cent were comparable to multiple-choice scores of 75 and 90 per cent, respectively (28:296-98). In a 1968 investigation of cloze--oral reading comparability, Bormuth concluded that cloze scores of 44 and 57 per cent were comparable to comprehension scores of 75 and 90 per cent, respectively; and cloze scores of 33 and 54 per cent were comparable to word accuracy scores of 95 and 98 per cent, respectively (29:196). In 1969 Rankin and Culhane replicated the two studies just described and corroborated the validity of Bormuth's

scores (76).

A note of caution was interjected by Weaver and Kingston related to the interpretation of cloze scores. A factor analysis, while showing loading of cloze tests on a comprehension factor, also showed a clearly defined redundancy factor on which all cloze tests loaded (90:259). Klare stated the problem in somewhat different terms:

> In the use of cloze tests as comprehension measures
> . . . missing words can be frequently restored without an 'understanding' of a passage. . . . cloze
> scores may well be measures of language redundancy
> as much as of comprehension. . . . The cloze test
> . . . is . . . a reliable measure. But is it an
> equally valid measure of comprehension? Walter
> MacGinitie . . . raises some doubts.[2] He points out
> that comprehension has been measured traditionally
> as the ability to ask questions about information in
> a passage. This kind of measurement is not without
> problems, notably the relative effect upon comprehension scores of the difficulty (and guessability)
> of the questions (apart from the difficulty of the
> language in the passage itself). In other words, you
> can ask hard questions about easy material, or easy
> questions about hard. In the cloze test, however,
> as MacGinitie points out, missing words can frequently be restored correctly without, what is usually
> called, an 'understanding' of a passage. All that is
> necessary is a recognition of familiar patterns of
> expression. That is, structure words can often be
> restored to a passage where the content words are
> only vaguely understood. Unless the blanks in the
> cloze test are appropriately selected (in much the
> same manner as test items) MacGinitie feels that
> cloze scores may well be measures of language redundancy as much as of comprehension (56:121).

[2]W. H. MacGinitie, "Comments on Professor Coleman's Paper." (paper presented at the Symposium on Verbal Learning Research and Technology of Written Instruction), Columbia University, 1966.

Three years earlier in 1963 Klare wrote of the values of cloze procedure:

> The cloze procedure is not a formula (even though it might 'predict' difficulty for a large group of readers based on results from a smaller sample). It is, however, a quick, easy and versatile testing technique that may well be used for developing criteria in the construction and validation of readability formulas (13:85).

Some limitations of the cloze procedure are obvious; for example, it is all but impossible to determine the readability of a book for these practical reasons stated by Fry:

> Were it not for the enormous amount of time this method takes, cloze procedure would be an excellent way to determine readability. In addition to the time it takes to make cloze passages, a number of different passages must be tested at the same time on the same group of children. One cannot return to the same group of children several months later, for their reading abilities will have changed and the cloze error scores will not be comparable. As a research tool the method is excellent but for practical purposes it is all but impossible to use (46: 536).

Lamb summed up the merits of the cloze procedure in a recent statement:

> While Cloze tests <u>do not</u> constitute a readability formula in the narrowest definition of that term, they do have the advantage of looking at the total linguistic structure of a selection which most readability formulas do not, . . . Cloze tests also provide important evidence regarding the level at which a given passage is understood (100:7).

Linguistic Structures

Linguistic structures (words, clauses, sentences,

longer passages) have been investigated by persons inter-
ested in the comprehension of the same by speakers, readers,
and writers of English. These investigators have pursued
readability studies or related studies to determine those
linguistic structures which impede or facilitate comprehen-
sion. The application of cloze tests in research design, as
noted in the previous paragraph, has afforded opportunities
for examining the linguistic structure of a passage and its
comprehensibility. Selected studies will be reviewed in
this section; the studies will survey some of the aspects
involved in the comprehension of linguistic structures by
speakers, readers, and writers of English.

Three studies of word depth are described here.
Yngve analyzed and diagrammed the structure of sentences.
He hypothesized that more complex sentences impose a greater
strain on the memories of the speaker and the listener. The
amount of memory storage necessary to produce a sentence was
called the "depth" of the sentence. Yngve assigned numeri-
cal value to each word according to its depth (position) in
the sentence. The importance of this model for readability
studies lies in the fact that it offered a means of assess-
ing the complexity of sentences which can be expressed nu-
merically (93). Botel, and others, developed a formula for
evaluating complexity of syntax. The formula has been based

on a theory of transformational grammar, experimental data

on children's processing of syntactic structures, and lan-

guage development including performance studies of oral and

written language of children. Syntactic structures have

been assigned numerical values; values increase as the com-

plexity of syntax increases (4). Bormuth tested a word-depth

method of measuring grammatical complexity of sentences to

see if the method could be used to predict the difficulty

children have in comprehending printed materials. A com-

puter assigned a number to each word as a measure of depth.

From this effort Bormuth inferred that the word-depth meas-

ure was a powerful predictor of comprehension of materials

of varying idea density or concept difficulty. He concluded

that word depth was also a more powerful predictor of com-

prehension difficulty than mean sentence length and propor-

tion of hard words as measured by the Dale-Chall (36) formu-

la (26:230).

Studies of the linguistic structure of sentences

have demonstrated that some structures are easier to compre-

hend. The cloze procedure was applied to sentences to

ascertain their comprehensibility by Aborn, and others.

Sentences varied in length, position, and type of words

omitted. The investigators concluded that those three vari-

ables were effective sources of constraint on words in

sentences (20:180). Nominalized sentences were compared, by means of cloze tests, to their grammatical transformations using active verbs. The active-verb version was more comprehensible. The investigators were Coleman and Blumenfeld (34). Coleman replicated and expanded this study, twice. He found significant differences among categories of grammatical transformations. The differences favored active verbs, nonembedded sentences, shorter clauses, and the shorter of matched pairs of transformations (32, 33).

Units longer than sentences have been studied to ascertain their comprehensibility. Fagan studied the effects of the cloze procedure and four types of transformations on the reading comprehension of pupils in grades four, five, and six. He concluded that sentence difficulty was more dependent on the presence and difficulty of transformations than was the difficulty of the passage. This was explained in terms of the redundancy of the language:

> That is, information which an individual may miss
> within the boundaries of a particular sentence may
> be acquired within some other sentences of the
> passage (42:171).

The effect of linguistic variables upon readers of differing achievement levels was studied by Jefferson. Through the application of the cloze procedure he concluded that linguistic variables (lexical and structural) could be expected to predict readability equally well for poor and

good readers. He further concluded that the cloze procedure
is capable of sampling lexical and structural categories.
He cautioned that the <u>nth</u> word deletion confounds those two
categories (53:177-78).

The degree of match between oral language structures
of children and the syntactic structures in their textbooks
has been studied; the degree of comprehension that occurs
when oral and written syntactic structures are matched has
also been studied. For example: oral language structures
(independent clauses) produced by children were compared
with the syntactic structures in elementary school reading
textbooks by Strickland. She concluded that the speech of
children was more sophisticated (85). Oral language struc-
tures, ranging from high to low frequency, were written into
reading passages for fourth-grade children in an investiga-
tion by Ruddell. His purpose was to study the effect of the
similarity of oral and written structure on reading compre-
hension. He concluded that reading comprehension was a
function of the degree of match of oral patterns of language
to the patterns of language structure in reading material.
He also concluded that reading material high in low-frequency
patterns was harder to comprehend (77).

Written language structures from a broad range of
grade levels were studied by Smith. Students from grades

four through twelve read cloze paragraphs rewritten by their
peers. Smith's purpose was to determine whether syntacti-
cally more complex structures increase reading difficulty or
whether all students, regardless of grade level, have the
same syntactic skills and thus read with equal facility
material written at different levels of syntactic maturity.
Vocabulary and content were held constant. Smith concluded
that students in grades four, five, and six found fourth-
grade writing easier to read than writing by more mature
students. For older students, fourth-grade writing was not
the easiest to read. Eighth-grade writing was most easy for
older students in grades eight through twelve to read. For
both groups, habit may explain the differential performance
(17:52-59). In a second study Smith challenged the assump-
tion that short sentences are an appropriate measure for the
readability of passages written for older readers. He
pointed out that shorter sentences may be appropriate for
younger children because they match their linguistic ex-
pressions; but older students use more complex linguistic
structures and therefore require more complex structures in
reading materials (82:357).

This review of the literature has thus far included
a functional definition of readability, an overview of for-
mulae from the earliest to the present state of the art, an

explanation of the cloze procedure and a suggestion of its

implications for readability, and a review of the research

by linguists into factors that impinge on the comprehensi-

bility of the written word.   This chapter will be complete

when two additional topics have been covered.   Those are:

the readability of subject area textbooks, and research

studies and views most directly related to the design of this

study.

Readability: Subject Area Textbooks

In 1949 Dale and Chall explained the limitations of

readability formulae for measuring the readability of

subject-area reading materials.   Chall asserted that read-

ability formulae are applicable only to material similar to

the criteria on which they are based as:

> Too often this is forgotten and an attempt is made
> to apply a formula, based on children's reading, to
> materials that are beyond its range of subject mat-
> ter and difficulty. . . . No studies are based
> exclusively on materials devoted to specialized
> areas such as science or mathematics (37:19-20).

Nine years later Chall observed that readability formulae

based on multiple correlations (number of syllables per sen-

tence, sentence length, etc.) tend to lose their accuracy

when applied to materials from subject matter areas differ-

ing from those used in the original studies (6).

There have been critics of the misapplication of

formulae. Three instances will be cited here: the Dale-
Chall (36) formula was applied in three separate studies by
Brown (31), Kane (55), and Froese (97). Brown concluded the
formula was inappropriate for application to science mate-
rials since much of the scientific vocabulary appeared out-
side the formula's list of easy words (31:164). Kane con-
cluded the formula was inappropriate for application to
mathematical textbooks. He explained that the language of
mathematical textbooks differs significantly from the lan-
guage in literary works--the basis of the formula's word
list (55:19). Froese concluded that cloze tests were more
reliable measures of language difficulty than the formula
readability levels in a study of science textbook materials
(97).

Numerous investigators have reported the lack of
match in textbooks, that is, between the grade assigned by a
publisher and the readability level assigned by formula.
Smith studied the readability of mathematics textbooks for
primary and intermediate grades. The Dale-Chall (36) and
Spache (83) formulae were applied. He concluded that read-
ability levels did not match the grade assigned by the pub-
lisher and that textbooks were too difficult for most of the
students (81:393).

Gallaway compared the readability of reading,

language, science, and social studies textbooks for grades

four, five, and six. The Dale-Chall (36) formula was

applied. The reading textbooks equated with assigned grade.

The remaining textbooks ranged from one to three grade

levels above assigned grade (98).

Cramer and Dorsey reported a mismatch between pub-

lisher estimates and formula rating for elementary science

textbooks. The Spache (83) formula was applied to six

series of primary level textbooks, the Dale-Chall (36) to

textbooks written for grades four, five, and six. Fourteen

of the eighteen primary textbooks were correctly matched,

but all of the eighteen textbooks for the middle grades were

rated above grade level. The range was three to seven

grades higher than the publisher's assigned grade (35:33).

The Dale-Chall (36) formula was applied to word

problems in arithmetic textbooks for grade six. The ratings

were compared with the readability of word problems in three,

standardized, arithmetic achievement tests. The textbook

readability levels were at grade; although there was a four

year spread in the range of samples taken. Test item read-

ability levels ranged from grade four to grade six. The

investigator was Smith (80:562).

Ottley applied the Lorge (63) formula to science

textbooks for grades four, five, and six. He concluded that

the textbooks for grade four were most difficult (poorest grade--readability match). The textbooks for grade six were the most well matched (best grade--readability match) (73: 365-66).

Efforts to simplify textbook material were reported by Williams. One unit of a science textbook for grade six was rewritten to a third-grade readability level by applying the Yoakam (94) formula. Those readers using the rewritten unit were more successful as measured by comprehension scores and reading rates (92:206).

The studies described thus far have been examples of formula readability--assigned-grade mismatches in textbooks for the elementary grades. Numerous investigators have reported similar examples of mismatches in the secondary grades. A selected few have been summarized in the following paragraphs.

The Dale-Chall (36) formula was applied in four separate studies by Belden (23), Wiegand (91), Lee and Hislop (59), and Smith (79). Belden concluded that only one of five biology textbooks was readable by a significant percentage of high school students. Reading scores were the criterion used for comparison (23). Wiegand concluded that the predicted readability of mathematics textbooks was consistently higher than the reading abilities of students.

Again, reading scores were the criterion used for comparison
(91). Lee and Hislop compared the readability of special
biology materials with two widely-used, general biology
textbooks. They concluded all were of equal difficulty but
above the reading level of students who must use them (59).
Smith measured the readability of mathematics textbooks for
grades seven and eight. Only six of the eleven textbooks
for grade seven were matched with grade. Only five of the
eleven textbooks for grade eight were matched with grade.
Smith concluded the formula was inappropriate for applica-
tion to mathematics textbooks (79).

The Flesch "Reading Ease" (44) formula was applied
in three separate studies by Marshall (69), Janz and Smith
(52), Simmons and Cox (78). Marshall rewrote passages in
physics textbooks and compared comprehension scores of two
groups of students. Both groups understood equally well.
He concluded the formula may be inappropriate for estimating
readability (69). Janz and Smith concluded that textbooks
in English, science, and social studies were unsuitable for
students in grades eight, nine, and ten when one year was
added to reading score means and means were compared with
readability ratings of textbooks (52). Using a similar
design, Simmons and Cox concluded that grammar textbooks for
grades seven, eight, and nine were higher in readability

than the reading scores of sixty-five per cent of the student population (78).

Negative student reactions were obtained after they read science and social studies textbooks. The "Fog" (10) formula was applied. It rated the textbooks six years higher than the reading scores of eleventh-grade students. The investigator was Symyrozum (86).

The readability of United Nations publications was studied by Michaelis and Tyler. They applied three formulae and administered a reading test of content to high school seniors. They concluded that the three formulae yielded disparate results, and the publications were too difficult for the students to understand (70).

Jacobson evaluated student understanding of passages from physics and chemistry textbooks. He concluded there was a significant difference in comprehensibility among textbooks, that the most readable textbooks were not most frequently used, and that textbooks lacked internal consistency (50).

The cloze test was applied to textbooks on American government, world history, biology, and chemistry; the difficulty of prose was found to be about the same in all textbooks. These conclusions contrasted sharply with the other studies cited here. The investigator was Beard (22).

Related Studies

Vocabulary is a crucial factor in assessing read-
ability. Twelve formulae in use are listed in Table 3 on
page 22. The reader will notice that seven of the formulae
have a variable identified as so-called, hard words, or,
noun frequency count. In all seven formulae, frequency of
occurrence of words (word difficulty) is a variable in the
measure of reading difficulty. It was explained earlier in
this chapter that the Talmudists counted words and indivi-
dual ideas so they could know how many times each word
appeared in the scroll, that is, how many times each word
appeared in an unusual sense as compared with its usual
meaning (64:544). It has also been explained that in 1840
frequency of vocabulary was a factor in deciding ease of
understanding in the McGuffey Readers (57:14).

There are studies which have established the fact
that quote: "frequency breeds familiarity." For example, in
a study by Noble of the relationship between familiarity and
frequency, he presented meaningless words visually. His
subjects repeated them orally. He concluded that familiar-
ity is determined almost uniquely by frequency (71:15).

The values of word frequency are not surprising when
one considers that a few words are used with high frequency,
for example, in telephone conversations. In a study by

H. R. French and others, as reported by Klare, 100 words were used 75 per cent of the time in a total of 80,000 words in 500 conversations (57:13). In another study by Clyde E. Noble, as reported by Klare, the investigator concluded that in speech 100 of the most frequently occurring words make up 49 per cent of the total (57:13).

Parallels to the occurrence frequency of words used in conversational speech are found in studies of the occurrence frequency of words used in reading materials. In a study by Carroll, and others, 1,000 words were used 74 per cent of the time in a total of 86,741 different words; 5,000 words were used 89.4 per cent of the time. Samples were taken from 1,045 books for grades three to nine. Carroll, and others, explained the predicament of the English teacher faced with this situation:

> This admixture of large numbers of common words with large numbers of rare words presents a kind of paradox that is the plague of the English teacher. Of course, it is true that many of the 'rare' word types are compounds of--or are derived from--common words, but even after these are laid aside, there still remain many rare words whose meanings must be learned if the student is to attain full comprehension of verbal materials to which he is exposed (5:xxviii).

In a study of the readability of twenty-five Newbery Award books a computer was used to determine the total number of different words and their frequency. It was found that 200 words were used 61 per cent of the time from a total

of 5,443 different words. The investigators were Moe and

Arnold (101:12).

Klare observed an interrelatedness of word frequency,

understanding, and a hierarchy in available meanings. His

observations seem to be a fitting conclusion for this part

of the discussion. He stated:

> The effects of frequency of occurrence of words upon
> superior comprehension in more . . . readable mate-
> rial takes several forms. First, increased fre-
> quency itself seems to play a role, as does the cor-
> responding increase in available meanings as fre-
> quency increases. The existence of a hierarchy
> among meaning frequencies apparently reduces the
> interference effects that might otherwise result
> when numbers of meanings are possible. Second,
> serial verbal learning appears to be improved, and
> perhaps free recall and other learning also. . . .
> Frequency of occurrence of words . . . clearly plays
> an all-pervasive role in language usage . . . humans
> . . . recognize more frequent words more rapidly
> than less frequent, prefer them, and understand and
> learn them more readily. It is not surprising,
> therefore, that this variable has such a central
> role in the measurement of readability (57:20).

Brinton and Danielson identified underlying relation-

ships in written language which suggested theoretical bases

of readability. They identified two factors. The first

included word frequency, length, and word familiarity and

was called the vocabulary factor. The second included

sentence length and syllables and was called the sentence

factor (30:423). Stolurow and Newman obtained similar

results in their study of the stylistic features of printed

materials. They found that relative difficulty of words

and relative sentence difficulty would account for a good deal of variance in readability (84:250).

In 1949 it was Lorge's opinion that the best single element for the prediction of any aspect of expressional difficulty is vocabulary load. "Some researchers . . . have found that an estimate of vocabulary load, in and of itself, is a sufficiently sensitive index of readability." (65:91)

The Botel (2) formula correlated at the .01 level of significance with four popular formulae in a study of the readability of selections for upper and secondary grades. The Botel formula utilized vocabulary as the only variable. The investigator in this study was Fry (45).

In another vocabulary study Botel validated his readability formula and vocabulary tests. He measured the usefulness of the Botel Word Opposites Test (3) and the Botel Word Recognition Test (3) for assigning reading text-books to students; the level of expected student performance was set at 95--99 per cent fluency in oral reading and 75--95 per cent comprehension in silent reading. He applied the Botel formula to the paragraphs of an informal reading inventory for reading textbooks published by the Scott, Foresman Company (15); he administered a total of four reading tests (including the two Botel tests) to a randomly selected

population of thirty, fourth-grade students. He concluded

that the Botel word tests and the Botel formula provided the

best match for the levels of expected performance (3:25,28).

Reading skills specialists and classroom teachers of

the Berkeley Unified School District, Berkeley, California,

have established the validity of the Botel (2) formula--

Botel (3) word-test match for determining placement of stu-

dents in reading textbooks. This has been accomplished

since 1970. Since that date specialists and teachers have

established a practice of administering the Botel word tests

and matching those results with Botel readability levels

calculated for State-adopted reading textbooks. Teachers

have then observed a student's comprehension level in the

assigned textbook. Performance expectancy for students has

been set at the levels stated in the previous paragraph.

Mata V. Bear, as reported by Klare, found that the

percentage of monosyllabic words in a selection provided a

fair index of reading difficulty (95:14).

The formula of Yoakam applied the weighted index of

words from Thorndike's (19) The Teacher's Word Book of

30,000 Words. Vocabulary was the sole variable. The for-

mula was last revised in 1948 (94).

In 1973 Harris described a formula for primary grades

which he had developed through the application of a computer.

Word samplings were taken from six reading-textbook series and from eight content-textbook series. A core list of 2,792 words resulted. The per cent of words not on the core list was one of eight variables identified by Harris. He concluded that it correlated highest with the grade levels assigned by publishers to their books (.87). He suggested that the use of just this one variable would simplify the use of the formula. This formula awaits validation with student reading performance (99).

Cloze scores were highly correlated with hard words on two popular word lists in a study reported by MacGinitie and Tretiak. They reported that the word list of 3,000 words from the Dale-Chall (36) formula and the word list of 769 words from the Lorge (63) formula did well at predicting cloze scores of the Miller-Coleman Readability Scale (21). MacGinitie and Tretiak stated:

> The cloze criterion scores for the passages of this scale are based on restorations by college students. The summed bilateral cloze criterion scores for the Miller-Coleman passages correlate -.91 with the ratio of hard words based on the 3,000 word list and -.89 with the ratio based on the 769-word list. These higher correlations and the fact that the number of one-syllable words and the number of letters per word correlate .88 and -.90, respectively, with the Miller-Coleman criterion scores (Coleman in press),[3]

[3]E. B. Coleman, "Developing a Technology of Written Instruction: Some Determiners of the Complexity of Prose," in Verbal Learning Research and the Technology of Written Instruction, ed. by E. Z. Rothkopf and P. E. Johnson (New York: Teachers College Press, in press).

emphasize the importance of vocabulary in the pre-
diction of the difficulty of reading passages
(67:375-76).

Summary

Literature related to the topic of readability has
been reviewed in this chapter. The reader learned that the
topic goes beyond a discussion of such variables as legibil-
ity, interest-value, and ease of understanding. An histor-
ical perspective was drawn through a description of the
evolution of readability formulae. Contrasting lines were
drawn with a description of cloze procedure and linguistic
structures. Restrictive lines were drawn in the review of
research related to the readability of subject area text-
books; there, lines were drawn by describing the inappro-
priate use of some readability formulae in research. Some
light was then cast on our perspective by singling out the
continuing importance of vocabulary. In all of this, this
writer was cautious not to attribute to vocabulary more
value than it deserves in the whole, or totality, called
readability. The five questions posed in the design of this
study address themselves to some considerations which must
become a part of that totality, if readability data sought
in this study is to be applied productively in our efforts
to match a reader with suitable reading materials.

A description of the readability formula applied and
the preliminary study will follow in the next chapter.

CHAPTER III

METHODS AND PROCEDURES

Introduction

In the fall of 1969 the principals of the fourteen
elementary schools in the City of Berkeley, California,
decided they would disregard the four categories of learners
described on pages 3 and 4 of this study. In discussions
they concluded that classroom teachers should assign the
adopted textbooks on the basis of the interests and the
reading abilities of each student; these should be matched
with the difficulty of textbooks. At that time this writer
agreed that the reading abilities of the student should be
matched with reading materials of appropriate difficulty.
One obvious method for achieving a match was to apply a
readability formula to determine levels of difficulty of the
textbooks. This writer viewed this as an opportunity to
challenge the implied assumptions, in the justification
Statement (103), that one series was more suitable for a
category of student than another--insofar as vocabulary was
concerned. This writer decided to apply the Botel (2) for-
mula to measure the difficulty of vocabulary in each text-
book. This chapter describes the readability instrument and
the preliminary analysis which followed this writer's

decision to match student reading ability with textbook difficulty.

The Instrument

The Botel (2) formula (hereafter referred to as the Formula) was selected for use in this study for a variety of reasons: (1) it was developed with words common to reading textbooks enjoying widespread use, (2) it was applicable to a wide range of reading levels commencing at grade one and extending beyond grade twelve, (3) any significant intra-text and inter-textbook differences in vocabulary usage would be readily apparent upon application of the Formula.

The development of the Formula was described in a manual published in 1962. Botel explained the steps as follows:

1. Assuming that basal readers are similar in diffi-culty, we made a study of the common words of five major basal reading programs at each level, from pre-primer through high third. We considered a word common at a given level if it appeared in three of the five readers. For example, since the word <u>look</u> appeared in at least three of the five pre-primers, we assigned <u>look</u> to a pre-primer level (2:8-9). [Botel referred the reader to pages 21-23 of the manual: the study to establish "Bucks County 1185 Common Words" list. See Appendix X for example.]

2. We then set out to establish a method which would compare the vocabulary of any book with typical basal readers. For example, if we should estimate the book to be beginning third level, this would mean that the

book was similar in vocabulary to the typical third grade basal reader.

3. Next, we classified samples of 100 words from 45 basal readers according to the level assigned by the '1185 Common Words' list. We used a form similar to the worksheet on page [See Appendix VII.] . . . Words not on the '1185 Common Words' list were assigned a 4+ level. When we compared the distribution of vocabulary from the same reading levels, as established by the publishers, we found this distribution to be remarkably similar. In each instance, a pattern appeared in the worksheets, or tables: Approximately nine different words in each 100 word sample were found to be <u>above</u> the company-assigned reading level.

    Following this pattern, we counted down nine different words and looked over to the left column for each 100 word sample. We were able to predict the reading level of 44 of the 45 basal readers within one-half grade level by using the designation in this column. In short, by the empirical observation of the pattern we found that the vocabulary distribution of primary basal readers at a given level is highly similar, ranging somewhere between eighty and ninety percent of the running words.

    In this technique, we assume that if a primary book has a vocabulary distribution pattern like that of a basal reader it has the same reading level. This, of course, is judging on vocabulary alone (2:9-10).

Botel wanted to be able to apply his Formula to materials written above third-grade level; he explained how that ability was assured:

4. . . . we tabulated 100-word samples of various reading materials: over 50 readers at the fourth, fifth, and sixth grade levels, many junior and senior high school textbooks, and many issues of <u>Reader's Digest</u>, <u>Time</u> magazine, and the <u>New York Times</u>. The results indicated that the total number of different words in the '4+ column' effectively indicated the reading difficulty.

    Thus we were able to establish a chart [see Appendix VIII] to use in estimating reading levels of

intermediate and secondary materials. [See Appendix IX for sample worksheet.]

Greater variability, from page to page and from story to story, was found in materials for fourth grade and above than in primary materials. Some stories in a so-called fourth grade book were as difficult as average sixth grade material, while senior high textbooks and the New York Times occasionally had materials such as found in typical sixth grade books. However, the sample of average difficulty was effective in discriminating among the levels (2:10-11).

Content validity of the Formula had been assured in Step 3 above, since 100-word samples taken from forty-five basal readers and the words on the "Bucks County 1185 Common Words" list (2:21-63) were remarkably similar in distribution. This happened because words for both sources had been drawn earlier from the Thorndike (19) list by publishers of reading textbooks.

Concurrent validity was affirmed in three studies reported earlier on pages 42 and 43 in Chapter II and repeated here. In the first study by Fry (45) the Formula correlated at the .01 level of significance with four currently-used formulae in an investigation of the readability of selections for intermediate and secondary grades. The Formula correlated at the .05 level of significance with three comprehension tests in the same study. In another investigation the two Botel (3) word tests and the Formula provided the best match fcr estimating reading textbook placement for fourth-grade students; the criteria were

fluency in oral reading and comprehension in silent reading
(3:25,28). Since 1970, reading skills specialists and
classroom teachers of the Berkeley Unified School District,
Berkeley, California, have established the validity of the
Formula--Botel (3) word-tests match for determining reading
textbook placement for students in grades one through six.
Teachers have followed up placement with observations of
student comprehension of content in the assigned textbook.
Comprehension standards have been set at 75--95 per cent for
silent reading. Assignments have not been 100 per cent
accurate, but the placement rate has been so satisfactory
that the practice has been encouraged by this writer and by
the reading skills specialists.

The author of the Formula urged its use as a simple
and easy-to-use method of determining a readability score
for general story materials; he did not recommend its use
for measuring subject-matter materials. He felt its value
is enhanced when the teacher knows the achievement levels of
students in reading textbooks or when reading levels have
been determined by the Botel (3) word tests. He cautioned
that readability scores obtained by the Formula are only
indirectly useful in assigning a specific book to a specific
child. "For no formula has yet been devised to take into
account such variables as motivation, format, illustrations,

adult assistance, and so forth." (2:3)

Preliminary Analysis

In 1970 this writer applied the Formula to a minimum of seven, 100-word passages in all of the adopted textbooks except the Open Highways Readers (16). He also applied the Fry (45) and the Spache (83) formulae to a limited number of the textbooks for intermediate and primary grade textbooks, respectively. Time did not permit the application of the Fry and Spache formulae to all textbooks. It was felt by this writer, following the application of the two formulae, that the small amount of information gained was not worth the effort expended. The Formula readability levels have been reported in Table 4; these were given to the Berkeley reading skills specialists for use and distribution to other teachers.

Summary

The readability instrument, validity studies, and the preliminary analysis have been described in this chapter.

Details of Formula application, and a statistical and descriptive analysis of the data will follow in the next chapter.

TABLE 4

READABILITY OF STATE-ADOPTED READING TEXTBOOKS: PRELIMINARY ANALYSIS OF 1970

PUBLISHER AND TITLE

Grade	Bank Street (CD)	Harper & Row (S&A)	Macmillan (F)
1 (1^2) (1^3)	Uptown, Downtown 2^1	Real and Make Believe 2^1 From Elephants to Eskimos 2^2	Lands of Pleasure 1^2
2 (2^1) (2^2)	My City 2^2 Green Light Go 2^1	All Through the Year 3^1 From Fins to Feathers 3^1	Enchanted Gates 2^1 Shining Bridges 2^2
3 (3^1) (3^2)	City Sidewalks 2^2 Round the Corner 2^2	From Far Away Places 3^2 From Bicycles to Boomerangs 3^1 (A)	Better than Gold 3^2 More than Words 3^2
4 (4^1) (4^2)		Trade Winds 3^2 From Codes to Captains 5	The Magic Word 4
5 (5^1) (5^2)		Crossroads 7 From Actors to Astronauts 5	Bold Journeys 6-7
6 (6^1) (6^2)		Seven Seas 6 From Coins to Kings 6	Into New Worlds 7-8

CHAPTER IV

ANALYSIS OF THE DATA

The Sampling Technique

The data secured from the preliminary analysis were reworked. In that initial analysis as few as seven, 100-word samples and as many as seventeen, 100-word samples were taken from each textbook. In the present analysis nine, 100-word samples were taken from twenty-four textbooks. Two textbooks for the Harper and Row Basic Reading Program (14) were combined into one volume at the first, fourth, fifth, and sixth grade reader levels because the textbooks in the remaining three series had only one volume at each of those grade levels.

The nine samples were located by dividing the total number of pages of text by nine. Some samples were retained from the preliminary analysis if they were reasonably close to the appropriate page number calculated for the present analysis. In some instances this was not possible so nine, new 100-word samples were taken. The Open Highways Readers (16) had not been sampled in the preliminary analysis and therefore were sampled in this study.

The starting point on each page was determined by pointing to the text with eyes closed. The first word in

each sample was the first word in the sentence to which this writer pointed. Each 100-word sample was counted at least two times by this writer to ensure accuracy of count. Words were written on worksheets and assigned a level. The accuracy of that work was checked once by this writer. The procedure has been described in the next section of this paper.

Application of the Formula

The Formula was applied to the reading textbooks in the following steps (and as demonstrated in Appendix XI). (1) Nine, 100-word samples were counted in each textbook. Initials, first names, letters, and numbers were eliminated from the count. Hyphenated words were counted as one word. The word was placed at the level of the higher element. If only one part of a hyphenated word was on the list, the word was counted as 4+. Compound names of persons and places were counted as one word. (2) Each word in the 100-word sample was checked for level against the "Bucks County 1185 Common Words" list (2:21-63). Words not on the list were assigned the level of 4+. (3) Each word in the sample was written on a worksheet. If a word appeared more than once in a sample, tally marks were placed after it. Derived forms of higher levels were listed separately; a tally mark was made after the base word when

the derived form was of the same level. (4) After the
100-word sample was placed on the worksheet, this writer
counted down to the ninth word to determine the readability
level. If there were nine or more words in the 4+ block a
chart was used to determine the readability level (Appendix
VIII). (5) After nine, 100-word samples had been placed on
the worksheet, the sample of median difficulty was deter-
mined. The readability level of that sample became the
readability level for that book (2:25-26).

<p align="center">Statistical Procedures</p>

Five questions were posed in Chapter I. The first
of the five was subjected to statistical analysis and was
stated in the form of the following null hypothesis: There
will be no significant difference found in the readability
levels of three collections of reading textbooks adopted by
the State of California for four student groups (cultur-
ally disadvantaged, slow, average, and fast). Readability
levels are to be measured with the Botel (2) formula. The
sign test was applied to the data to test the null
hypothesis. This nonparametric test was applied to paired
samples from the four textbook series. The paired samples
constituted a two-category population (positive differences
and negative differences) with the probability of any
difference being positive--equal to the probability that

it would be negative. The null hypothesis was expressed in
the following formula: $H_O : P = Q = \frac{1}{2}$; where H_O = the null
hypothesis, P = the proportion of cases in one class in a
two-category population, and Q = the proportion of cases in
the other class of a two-category population (11:256-57).

Analysis of Results

To apply the sign test the nine, 100-word samples
were paired for each textbook of the four textbook series.
This required three paired groups (1-2, 2-3, 1-3). Each of
the nine pairs was assigned a positive (+) sign of differ-
ence, a negative (-) sign of difference, or a neutral (0)
sign. The latter indicated a perfect match. Perfect
matches were subtracted from $\underline{N}$ (number = 9) and x repre-
sented the smaller of the observed frequencies (either + or
-) in a series of nine pairs. Once the values of x and $\underline{N}$
were known, the two-tailed probability was calculated at the
.05 level of significance and H_O was either accepted or
rejected. See the example on the next page. In the example,
nine paired samples in the textbook comparisons of <u>Bank
Street--Harper and Row</u> and <u>Harper and Row--Macmillan</u> were
significantly different at the 0.05 and 0.01 levels, respec-
tively. The H_O was accepted for the <u>Bank Street--Macmillan</u>
comparison. In Appendix XII the details of application of

Publisher's Grade Assignment		Samples	Bank Street (CD)	Cols. (1-2)	Harper & Row (S&A)	Cols. (2-3)	Macmillan (F)	Cols. (1-3)
			(1)		(2)		(3)	
1	(1^2)	1	1^2	−	2^1	+	1^2	0
		2	1^2	−	2^1	+	1^2	0
		3	2^1	0	2^1	+	1^2	+
		4	2^1	0	2^1	+	1^2	+
		5	2^1	−	2^2	+	1^2	+
		6	1^2	−	2^2	+	2^1	−
		7	1^2	−	2^2	+	1^2	0
		8	2^1	−	2^2	+	2^1	0
		9	2^1	−	3^1	+	2^1	0
		$\overline{N}$	2^1	$\dfrac{0}{7}$	2^2	$\dfrac{0}{9}$	1^2	$\dfrac{1}{4}$
				.016**		.004*		1.00+

**p < .05
*p < .01
+H_0 accepted

the sign test are given.

Table 5, shown on page 58, is a summary of those instances where significant differences occurred in paired samples among the three groups of textbooks shown in Appendix XII.

The results, reported in Table 5 on the next page, established that three of the five textbooks adopted for grades one, two, and three differed significantly; that is, three textbooks for the culturally disadvantaged group were easier than textbooks for the slow and average group but did

TABLE 5

SUMMARY OF SIGNIFICANT DIFFERENCES IN READABILITY
AMONG STATE-ADOPTED TEXTBOOKS FOR CULTURALLY
DISADVANTAGED (CD), SLOW (S), AVERAGE (A),
FAST (F) STUDENT GROUPS

Publisher's Grade Assignment	(1-2) (CD)-(S&A)	(2-3) (S&A)-(F)	(1-3) (CD)-(F)
1 (1^2)	2^1-2^{2**}	2^2-1^{2*}	-
2 (2^1)	2^2-3^{1*}	3^1-2^{1**}	-
(2^2)	-	-	-
3 (3^1)	2^2-3^{1**}	-	-
(3^2)	-	-	-
	(CD&S)-(A)	(A)	(CD&S)-(F)
4	-	-	-
5	-	-	4-6**
6	-	-	-
*0.01 (two-tailed test) **0.05 (two-tailed test)			

not differ significantly when compared with textbooks for

the fast group. Two of the five textbooks adopted for grades

one, two, and three differed significantly in a second com-

parison; that is, two textbooks for the fast group were

significantly less difficult than textbooks for the slow and

average group. Textbooks adopted for grade five differed

significantly in one comparison; that is, the textbook for

the culturally disadvantaged group was significantly easier

than the textbook for the fast group. The H_O was accepted

for the remaining comparisons. No other significant differ-

ences were obtained.

TABLE 6

READABILITY LEVELS OF STATE-ADOPTED READING TEXTBOOKS

Publisher's Grade Assignment	Bank Street (CD)	Harper & Row (S&A)	Macmillan (F)
1 (1^2)	2^1	2^2	1^{2}*
2 (2^1)	2^2	3^1	2^{1}*
(2^2)	2^1	3^1	2^{2}*
3 (3^1)	2^2	3^{1}*	3^2
(3^2)	2^2	3^1	3^{2}*
	Scott, Frsmn. (CD&S)	(A)	
4 (4)	3^2	5	4*
5 (5)	4	7	6
6 (6)	6*	7	8

*Readability level matches publisher's grade assignment. N = 7 (29 per cent).

Descriptive Procedures

The second question posed was: Is there a gradual increase in the readability levels within each of the three collections of textbooks, starting with textbooks for grade one and continuing through textbooks for grade six? The conclusion was a qualified, no. Table 6, shown on this page, was constructed to assist in the answering of that question; the readability levels of the textbooks have been shown in it. A visual inspection of the data revealed there was not, in all cases, a gradual increase in the readability levels within each of the three collections of textbooks for the four student groups, starting with textbooks for grade one

and continuing through textbooks for grade six. Only seven
(29 per cent) of the twenty-four textbooks were matched with
respect to readability level and the publisher's grade
assignment. There was a noticeable absence of a gradual
increase in readability levels between textbooks within the
Bank Street and Harper and Row series for grades two and
three. The Macmillan textbooks achieved the most gradual
increase in readability levels between textbooks and thus,
the best match of readability level with publisher's grade
assignment.

The third question posed was: When nine, 100-word
samples are drawn from each textbook, will the readability
level of the samples increase gradually, starting with the
first sample and ending with the ninth sample? The con-
clusion was, no. A visual inspection of the data in Table
7 on the next page led to the following conclusions: (1) as
observed earlier, in only seven (29 per cent) of the text-
books did the readability level of the first sample match
the publisher's assigned grade; (2) in ten (42 per cent) of
the textbooks a minimum of one sample (between the second
and eighth) was below the readability level of the first
sample; (3) in four (17 per cent) of the textbooks the read-
ability levels of the first sample and the ninth sample were
identical; (4) in six (25 per cent) of the textbooks the
readability level of the ninth sample was lower than the

TABLE 7

READABILITY LEVELS OF NINE, 100-WORD SAMPLES TAKEN FROM TWENTY-FOUR, STATE-ADOPTED READING TEXTBOOKS

Samples	(1²) Bank Street	(1²) Harper & Row	(1²) Macmillan	(2¹) Bank Street	(2¹) Harper & Row	(2¹) Macmillan	(2²) Bank Street	(2²) Harper & Row	(2²) Macmillan	(3¹) Bank Street	(3¹) Harper & Row	(3¹) Macmillan	(3²) Bank Street	(3²) Harper & Row	(3²) Macmillan	(4) Scott, Frsm.	(4) Harper & Row	(4) Macmillan	(5) Scott, Frsm.	(5) Harper & Row	(5) Macmillan	(6) Scott, Frsm.	(6) Harper & Row	(6) Macmillan
1	1^2*	2^1	1^2*	2^2	2^2	2^1*	2^2*	2^1	2^2*	3^1*	3^1*	3^2	2^2	3^1	3^2	3^1	3^2	3^2	6	9	8	3^2	4	3^2
2	1^2	2^1	1^2	2^1	3^1	2^1	3^1	3^1	3^1	2^2	3^1	3^1	2^2	3^1	3^2	3^2	3^2	3^2	5-	8-	7-	7	8	9
3	2^1	2^1	1^2	3^1	3^1	2^1	2^1	3^2	2^2	3^1	3^2	3^1	2^2	3^2	2^2	4	3^2	4	2^2-	7-	6-	6	7	:0
4	2^1	2^1	1^2	2^1	3^1	2^1	2^1	3^2	3^1	2^2	3^2	2^2	5	5	4	3^1	5	6	3^1-	6-	7-	6	9	6
5	2^1	2^2	1^2	2^1	2^2	2^2	2^1	3^2	2^2	2^2	3^1	3^2	2^2	3^1	3^2	3^2	5	4	3^1-	3^1-	6-	12+	7	3^2
6	1^2	2^2	2^1	3^1	3^1	2^1	3^2	3^1	2^1	2^2	6	5	4	6	5	3^2	3^1	6	4-	4-	6-	6	6	10
7	1^2	2^2	2^1	3^1	3^1	2^1	2^2	3^1	3^1	3^1	3^1	6	2^2	3^1	6	3^2	7	5	3^1-	5-	5-	9	9	8
8	2^1	2^2	2^1	2^2	3^2	2^1	2^1	2^1	2^2	2^2	3^2	3^2	3^1	6	3^2	5	6	4	5-	7-	3^2-	3^2	6	8
9	2^1+	3^1+	2^1+	2^1	3^1+	2^1+	2^1	3^1+	3^1+	3^1=	3^1=	3^2=	6+	3^1=	2^2	3^1+	8+	6+	4-	8	7	5+	5+	6+
Mdn.	2^1	2^2	1^2	2^2	2^1	2^1	2^1	3^1	2^2	2^2	3^1	3^2	2^2	3^1	3^2	3^2	5	4	4	7	6	6	7	8

* Readability of first sample matched publisher's assigned grade (29 per cent).

- Readability in at least one sample (between the second and eighth) was below the readability of the first sample (42 per cent).

= Readability of the first sample and ninth sample were identical (17 per cent).

N Readability of the ninth sample was lower than the first sample (25 per cent).

+ Readability of the ninth sample was higher than the first sample (58 per cent).

first sample; (5) conversely, in fourteen (58 per cent) of the textbooks the readability level of the ninth sample was higher than that of the first sample.

The fourth question posed was: Does the range of readability levels of samples drawn from textbooks vary from book-to-book within each of the three collections of textbooks, starting with the textbook for grade one and continuing through the textbook for grade six? The conclusion was a qualified, yes. Tables 8 and 9, on pages 63 and 64, were constructed to determine any differences in range. The readability levels of nine, 100-word samples, drawn from each of the twenty-four textbooks, have been shown in Table 8. Each of the nine samples has been listed in rank order from the lowest readability level (rank 1) to the highest readability level (rank 9). Samples were rank ordered so that interquartile ranges could be calculated for each textbook. The interquartile range is the distance between Q_3 and Q_1 or 50 per cent of the distribution. In nine samples the value of Q_1 equals 2 (second sample) and the value of Q_3 equals 8 (eighth sample). Thus, the task was to subtract the value of sample 2 from the value of sample 8 to determine the interquartile range (8:32). To accomplish this it was first necessary to assign values of an interval scale to the readability levels of the Formula. That was done in

TABLE 8

INTERQUARTILE RANGE OF NINE, 100-WORD SAMPLES TAKEN FROM TWENTY-FOUR, STATE-ADOPTED READING TEXTBOOKS

Samples**	(1²) Bank Street	(1²) Harper & Row	(1²) Macmillan	(2¹) Bank Street	(2¹) Harper & Row	(2¹) Macmillan	(2²) Bank Street	(2²) Harper & Row	(2²) Macmillan	(3¹) Bank Street	(3¹) Harper & Row	(3¹) Macmillan	(3²) Bank Street	(3²) Harper & Row	(3²) Macmillan	(4) Scott, Frsmn.	(4) Harper & Row	(4) Macmillan	(5) Scott, Frsmn.	(5) Harper & Row	(5) Macmillan	(6) Scott, Frsmn.	(6) Harper & Row	(6) Macmillan	Samples**
1	1^2	2^2	1^2	2^1	2^2	2^1	2^1	2^1	2^1	2^2	3^1	2^1	2^2	3^1	2^2	3^1	3^1	3^2	2^2	3^1	3^2	3^2	4	3^2	1
2	2^1	2^1	1^2	2^1	2^1	2^1	2^1	2^1	2^1	2^2	3^1	2^2	2^2	3^1	2^2	1^1	3^2	3^2	3^1	4	5	3^2	5	3^2	2
3	1^2	2^1	1^2	2^1	3^1	2^1	2^1	3^1	2^2	2^2	3^1	2^2	2^2	3^1	2^2	3^2	3^2	4	3^1	5	6	5	6	5	3
4	1^2	2^1	1^2	2^1	3^1	2^1	2^1	3^1	2^2	2^2	3^1	3^1	2^2	3^1	2^2	3^2	3^2	4	4	6	6	6	6	6	4
5	1^2	2^1	1^2	2^2	3^1	2^1	2^1	3^1	2^2	2^2	3^1	3^1	2^2	3^1	3^2	3^2	5	4	4	7	6	6	7	8	5
6	2^1	2^2	1^2	2^2	3^1	2^2	2^2	3^2	3^1	3^1	3^1	3^2	3^1	3^2	3^2	3^2	5	5	4	7	7	6	7	8	6
7	2^1	2^2	2^1	2^2	3^1	2^2	2^2	3^2	3^1	3^1	3^2	3^2	4	5	4	3^2	6	6	5	8	7	7	8	8	7
8	2^1	3^1	2^1	3^1	3^2	2^2	3^1	3^2	3^1	3^1	3^2	3^2	5	6	5	4	7	$6^.$	$5^.$	$8^.$	$7^.$	9	9	$9^.$	8
9	2^1	3^1	2^1	3^1	4	3^1	3^2	4	3^1	3^1	3^2	3^2	6	6	6	5	8	6	6	9	8	12+	9	10	9
Mdn	2^1	2^2	1^2	2^2	3^1	2^1	2^1	3^1	2^2	2^2	3^1	3^2	2^2	3^1	3^2	3^2	5	4	4	7	6	6	7	8	
Q3	20	25	20	30	35	25	30	35	30	30	35	35	50	60	50	40	70	60	50	80	70	90	90	90	
Q1	15	20	15	20	25	20	20	20	25	25	30	25	25	30	25	10	35	35	20	40	50	35	50	35	
Range*	5	5	5	10	10	5	10	15	5	5	5	10	25	30	25	30	35	25	20	40	20	55	40	55	

*Decimals omitted
**Rank Order

TABLE 9

INTERVAL-SCALE VALUES ASSIGNED TO FORMULA
READABILITY LEVELS

Formula Level	Scale Value
1^2	1.5
2^1	2.0
2^2	2.5
3^1	3.0
3^2	3.5
4	4.0
5	5.0
6	6.0
7	7.0
8	8.0
9	9.0

Table 9 above.

Thus, the interquartile range was calculated for each textbook by applying the formula $Q_3 - Q_1$; that is, sample 8 minus sample 2. For example in Table 8, __Bank Street__ (1^2): $Q_3 = 2^1$, $Q_1 = 1^2$; therefore, $2^1 - 1^2 = 2.0 - 1.5 = .5$. Thus the interquartile range was .5 for that textbook. Interquartile ranges were calculated for the twenty-four textbooks and have been summarized in Table 10 on the next page.

A visual examination of the data in Table 10 revealed a sharp rise in the size of the interquartile range in all

TABLE 10

SUMMARY OF INTERQUARTILE RANGE OF NINE, 100-WORD SAMPLES TAKEN FROM TWENTY-FOUR, STATE-ADOPTED READING TEXTBOOKS WITH SIGN TEST APPLIED

Publisher's Grade Assignment	Bank Street (CD) (1)	Cols. (1-2)	Harper & Row (S&A) (2)	Cols. (2-3)	Macmillan (F) (3)	Cols. (1-3)
1 (1^2)	.5	0	.5	0	.5	0
2 (2^1)	1.0	0	1.0	+	.5	+
(2^2)	1.0	–	1.5	+	.5	+
3 (3^1)	.5	0	.5	–	1.0	–
(3^2)	2.5	–	3.0	+	2.5	0
	Scott, Frsmn. (CD&S)		(A)			
4 (4)	1.0	–	3.5	+	2.5	–
5 (5)	2.0	–	4.0	+	2.0	0
6 (6)	5.5	+	4.0	–	5.5	0
$\frac{\Sigma}{N}$		$\frac{1}{5}$		$\frac{2}{7}$		$\frac{2}{4}$
		.376+		.454+		1.00+

+ H_0 accepted

three textbook collections. This occurred in the third reader, second part (3^2). It was clear that the interquar- range varied from book-to-book within each of the three collections of textbooks.

The fifth question posed was: Is there a difference in the range of readability levels of samples drawn from the three collections of textbooks, starting with a comparison of all textbooks for grade one and continuing through all textbooks for grade six? The conclusion was a qualified, yes. In this fifth comparison interquartile ranges were compared at each grade level across the three collections shown in Table 10 on the previous page. The ranges were identical for first-grade textbooks, but this was not true at any other point in the Table. However, two of the three interquartile ranges were identical in textbooks for grade two (2^1), grade three $(3^1$ and $3^2)$, grade five (5), and grade six (6). The sign test was applied to determine if there were significant differences in the interquartile ranges of the three textbook collections (11:256-57). No significant differences were found; H_O was accepted.

Summary

This chapter has included a description of sampling procedures, formula application, statistical methods used,

and a statistical and descriptive analysis of obtained read-

ability data.

The next chapter will include a summary of findings

and recommendations.

CHAPTER V

SUMMARY OF FINDINGS, RECOMMENDATIONS,
AND EDUCATIONAL IMPLICATIONS

The Purpose Restated

The purpose of this study was to determine if there

was a significant difference in the readability of reading

textbooks adopted by the State of California for four

student groups in grades one through six: the culturally

disadvantaged, the slow, the average, and the fast. A fur-

ther purpose was to suggest, on the basis of readability

data, procedures teachers may follow when assigning reading

textbooks to students.

Findings

Five questions were posed to answer the purpose of

this study. The first question was stated in the form of a

null hypothesis: There will be no significant difference

found in the readability of three collections of reading

textbooks adopted by the State of California for four student

groups (culturally disadvantaged, slow, average, and fast).

Significant differences were obtained when comparing text-

books for the culturally disadvantaged--slow and average,

student groups; differences were present in three of the

five comparisons for grades one, two, and three. Significant differences were also obtained when comparing textbooks for the slow and average--fast, student groups; differences were present in two of the five comparisons for grades one, two, and three. One significant difference was obtained when comparing textbooks for the culturally disadvantaged--fast, student groups for grade five (Table 5, page 58).

The second question was posed to determine if there was a gradual increase in the readability levels within each of the three collections of textbooks. A visual inspection of readability data in Table 6 on page 59 revealed that the Macmillan textbooks achieved the most gradual increase in readability level from textbook-to-textbook.

The third question was posed to determine if there was a gradual increase in readability from the first to the ninth sample within each textbook. There was not. Readability levels fluctuated between the two samples (Table 7, page 61).

The fourth question was posed to determine if the range of readability levels within each of the textbooks was the same for the twenty-four volumes. It was not. There was an appreciable increase in range for all textbooks commencing with third reader, part two (3^2) through sixth reader (6) (Table 10, page 65).

The fifth question was posed to determine if there was a difference in readability range among the three collections of textbooks at each grade level. A visual inspection of data in Table 10 on page 65 revealed the ranges were identical only for first-grade textbooks across the three collections. There were no significant differences in the interquartile ranges when comparisons were made among the three collections.

Earlier, in Chapter I, this writer made inferences about the difficulty of vocabulary in the adopted textbooks. Those inferences were described in Chapter I under the heading "Need for this Study." They were made by this writer after he had read the vocabulary portion of the justification Statement (103:17,21,24,26). For the data described in this, and the following two paragraphs, please refer to Table 5 on page 58. In the instance of vocabulary used in the Bank Street and Open Highways readers, it had been anticipated that the vocabulary would deviate measurably from the Harper and Row and Macmillan readers--especially since the justification Statement explained that the text in the first two reader series was descriptive of real-life experiences and utilized the syntax of spoken language (103:24, 26). The resulting lower readability ratings for the Bank Street readers suggested that the textbooks were

significantly _easier_ in three of the five comparisons with
the _Harper and Row_ readers. Only one of the _Open Highways_
readers was noted to differ significantly from the remain-
ing two collections. In that comparison the fifth-grade
textbook was easier than the _Macmillan_ reader adopted for
the fast student group.

In the instance of the vocabulary used in the _Harper
and Row_ readers, it had been anticipated that an expanded
vocabulary for grades one through three and an elimination
of vocabulary controls at grade five would yield textbooks
more difficult than the grade assigned them by the publisher.
This was true in six of the eight volumes (Table 6, page 59).
It had also been anticipated that the _Harper and Row_ readers
would be more difficult than the _Bank Street_ and _Open High-
ways_ readers. This was true in the case of the _Bank Street_
readers as described in the previous paragraph; but the same
difference did not occur in the comparisons with the _Open
Highways_ readers. Further, it had not been anticipated that
the _Harper and Row_ readers for grades one and two would have
significantly higher readability ratings than the _Macmillan_
readers adopted for the fast student group.

In the instance of the vocabulary used in the
Macmillan readers, it had been anticipated that the readers
would be significantly more difficult than the vocabulary in

the other two collections because vocabulary controls had, alledgedly, been eliminated for all textbooks in that series. That was not the case. Instead, only one textbook out of eight had a readability level significantly higher than the others.

This writer had anticipated that the readability of the twenty-four textbooks in the collections would be higher than the grade levels assigned by publishers. This was true in only eleven of twenty-four comparisons (Table 6, page 59).

Recommendations for Further Research

Vocabulary was the sole variable analyzed in this study. Future research should include an analysis of syntax, style, and semantic variability; reader and teacher backgrounds, interests, and degree of motivation should also be studied.

Educational Implications

Earlier in Chapter II readability was defined by Gilliland in terms of matching--matching materials differing widely in content, style, and complexity with readers who can comprehend them (9:12). Using a similar theme, Botel described readability in terms of matching pupils with books. He cited seven variables and called them crucial in the

matching process. The variables were: vocabulary, syn-

tactic difficulty, style, semantic variability, reader

interest, reader background, and level of motivation (106).

On the same occasion, Ruddell described readability as the

fit between the reader's linguistic, cognitive, and affective

background and the reading materials (106).

The educational implications of this study are obvi-

ous and can be stated simply: The readability of textbooks

is one important variable which can assist teachers in

achieving a match or fit of materials to readers when it is

weighed with other variables like those just enumerated.

The task of achieving a match has been a continuing

process for the reading skills specialists and classroom

teachers of the Berkeley Unified School District, Berkeley,

California, since 1970. Since that date specialists and

teachers have established a practice of administering word

tests prepared by teachers or published tests like the Botel

(3). Teachers have then compared those results with the

Formula readability levels calculated for the adopted read-

ing textbooks. Word-test results and Formula levels have

been matched; then textbooks have been selected and assigned

on the basis of teacher judgement regarding interest poten-

tial of content when weighed against the background and

level of motivation of students. Once assigned, teachers

have then observed how well students comprehend textbook

content.   Performance standards were set at 95--99 per cent

fluency in oral reading and 75--95 per cent comprehension in

silent reading.

The procedures outlined above have been described in

greater detail in Appendix XIII, on page 103, under the

title: <u>Matching Students and Books: A Handbook for Teachers</u>.

Summary

This chapter has included a restatement of the pur-

pose of this study, a restatement of the five questions

posed with summarized findings, and recommendations for

further research--extending to teacher background, interests,

and motivation.

SELECTED BIBLIOGRAPHY

Books

1. Bank Street College of Education. The Bank Street
        Readers. New York: The Macmillan Company, 1965 and
        1966.

2. Botel, Morton. Predicting Reading Levels. Chicago:
        Follett Publishing Company, 1962

3. _____. Revised Guide to the Botel Reading Inventory.
        Chicago: Follett Educational Corporation, 1970.

4. _____; Dawkins, John; and Granowsky, Alvin. "A Syn-
        tactic Complexity Formula." Assessment Problems in
        Reading. Edited by Walter H. MacGinitie. Newark,
        Delaware: International Reading Association, 1973.

5. Carroll, J. B.; Davies, Peter; and Richman, Barry. The
        American Heritage Word Frequency Book. Boston:
        Houghton Mifflin Company, 1971.

6. Chall, J. S. Readability: An Appraisal of Research and
        Application. Columbus, Ohio: Bureau of Educational
        Research Monographs, No. 34. Ohio State University,
        1958.

7. Flesch, R. F. How to Make Sense. New York: Harper and
        Brothers, 1954.

8. Franzblau, Abraham N. A Primer of Statistics for
        Non-Statisticians. New York: Harcourt, Brace and
        World, Inc., 1958.

9. Gilliland, John. Readability. London: University of
        London Press Ltd., 1972.

10. Gunning, R. The Technique of Clear Writing. New York:
        McGraw-Hill, 1952.

11. Haber, Audrey and Runyon, R. P. General Statistics.
        Reading, Massachusetts: Addison-Wesley Publishing
        Company, 1969.

12. Harris, A. J. The Macmillan Reading Program. New York:
        The Macmillan Company, 1966.

13. Klare, G. R. The Measurement of Readability. Ames, Iowa: Iowa State University Press, 1963.

14. O'Donnell, Mabel and Eleven Others. Harper and Row Basic Reading Program. Evanston, Illinois: Harper and Row, Publishers, 1966.

15. Robinson, H.; Monroe, M.; Artley, A.; Huck, C.; Jenkins, W.; Aaron, A.; Weintraub, S.; and Greet, W. The New Basic Readers. Chicago: Scott, Foresman and Company, 1965.

16. Robinson, H.; Monroe, M.; Artley, A.; Huck, C.; Jenkins, W.; Aaron, I. The Open Highways Readers. Chicago: Scott, Foresman and Company, 1966.

17. Smith, William. "The Effect of Transformed Syntactical Structures on Reading." Language, Reading and the Communication Process. Edited by Carl Braun. Newark, Delaware: International Reading Association, 1971.

18. Thorndike, Edward L. The Teacher's Word Book. New York: Teachers College, Columbia University, 1921.

19. _____, and Lorge, Irving. The Teacher's Word Book of 30,000 Words. New York: Bureau of Publications, Teachers College, Columbia University, 1944.

Journals, Proceedings, Yearbooks,
and Bulletins

20. Aborn, M.; Rubenstein, H.; and Sterling, T. D. "Sources of Contextual Constraint upon Words in Sentences." Journal of Experimental Psychology, 57 (March, 1959), 171-80.

21. Aquino, Milagros R. "The Validity of the Miller-Coleman Readability Scale." Reading Research Quarterly, 4 (Spring, 1969), 342-57.

22. Beard, J. G. "Comprehensibility of High School Textbooks: Association with Content Area." Journal of Reading, 11 (December, 1967), 229-34.

23. Belden, B. R. "Readability of Biology Textbooks and the Reading Ability of Biology Students." <u>School Science and Mathematics</u>, 61 (December, 1961), 689-93.

24. Bloomer, R. H. "Level of Abstraction as a Function of Modifier Load." <u>Journal of Educational Research</u>, 52 (March, 1959), 269-72.

25. Bormuth, John R. "Cloze as a Measure of Readability." <u>Reading As An Intellectual Activity</u>, Proceedings of the International Reading Association Convention, Edited by J. A. Figurel, New York: Scholastic Magazines, 1963.

26. _____. "Mean Word Depth as a Predictor of Comprehension Difficulty." <u>California Journal of Educational Research</u>, 15 (November, 1964), 226-31.

27. _____. "Readability: A New Approach." <u>Reading Research Quarterly</u>, 1 (Spring, 1966), 79-132.

28. _____. "Comparable Cloze and Multiple-Choice Comprehension Test Scores." <u>Journal of Reading</u>, 10 (February, 1967), 291-99.

29. _____. "Cloze Test Readability: Criterion Reference Scores." <u>Journal of Educational Measurement</u>, 5 (Fall, 1968), 189-96.

30. Brinton, J. E. and Danielson, W. A. "A Factor Analysis of Language Elements Affecting Readability." <u>Journalism Quarterly</u>, 35 (Fall, 1958), 420-26.

31. Brown, W. R. "Science Textbook Selection and the Dale-Chall Formula," <u>School Science and Mathematics</u>, 65 (February, 1965), 164-67.

32. Coleman, Edward B. "The Comprehensibility of Several Grammatical Transformations." <u>Journal of Applied Psychology</u>, 48 (June, 1964), 186-90.

33. _____. "Learning of Prose Written in Four Grammatical Transformations." <u>Journal of Applied Psychology</u>, 49 (1965), 332-41.

34. _____, and Blumenfeld, J. P. "Cloze Scores and Nominalizations and Their Grammatical Transformations Using Active Verbs." <u>Psychological Reports</u>, 13 (December, 1963), 651-54.

35. Cramer, W. and Dorsey, S. "Science Textbooks--How Readable are They?" Elementary School Journal, 70 (October, 1969), 28-33.

36. Dale, E. and Chall, Jeanne S. "A Formula for Predicting Readability." Educational Research Bulletin, 27 (January, 1948), 11-20.

37. _____. "The Concept of Readability." Elementary English, 26 (January, 1949), 19-26.

38. Dale, E. and Tyler, R. W. "A Study of the Factors Influencing the Difficulty of Reading Materials for Adults of Limited Reading Ability." Library Quarterly, 4 (July, 1934), 384-412.

39. Danielson, W. A. and Bryan, S. D. "Computer Automation of Two Readability Formulas." Journalism Quarterly, 40 (Spring, 1963), 201-06.

40. Dolch, E. W. "Vocabulary Burden." Journal of Educational Research, 17 (March, 1928), 170-83.

41. Elley, Warwick B. "The Assessment of Readability by Noun Frequency Counts." Reading Research Quarterly, 4 (Spring, 1969), 411-27.

42. Fagan, William T. "Transformations and Comprehension." Reading Teacher, 25 (November, 1971), 169-72.

43. Farr, J. N.; Jenkins, J.; and Paterson, D. "Simplification of Flesch Reading Ease Formula." Journal of Applied Psychology, 35 (October, 1951), 333-37.

44. Flesch, Rudolph. "A New Readability Yardstick." Journal of Applied Psychology, 32 (June, 1948), 221-33.

45. Fry, E. B. "A Readability Formula that Saves Time." Journal of Reading, 11 (April, 1968), 513-16 and 575-78.

46. _____. "The Readability Graph Validated at Primary Levels." Reading Teacher, 22 (March, 1969), 534-38.

47. Gallant, R. "Use of Cloze Tests as a Measure of Readability in the Primary Grades." Reading and Inquiry, Proceedings of the International Reading Association Conference, Edited by J. A. Figurel, Newark, Delaware, 1965.

48. Gray, William C. "Progress in the Study of Readability."
     <u>Library Trends</u>. Chicago: University of Chicago
     Press, 1937, 237-54.

49. _____, and Leary, B. E. "What Makes a Book Readable?"
     <u>Journal of Adult Education</u>, 6 (October, 1934), 408-
     11.

50. Jacobson, M. D. "Reading Difficulty of Physics and
     Chemistry Textbooks." <u>Educational and Psychological</u>
     Measurement, 25 (Summer, 1965), 449-57.

51. Jacobson, M. P. and MacDougall, M. A. "Computer Manage-
     ment of Information and Structure in Computer-Sup-
     ported Instructional Materials." <u>Educational Tech-
     nology</u>, 10 (March, 1970), 39-42.

52. Janz, M. L. and Smith, E. H. "Students' Reading Ability
     and the Readability of Secondary School Subjects."
     <u>Elementary English</u>, 49 (April, 1972), 622-24.

53. Jefferson, G. L., Jr. "Lexical and Structural Items as
     Predictors of Readability for High and Low Ability
     Readers." <u>Reading: Process and Pedagogy</u>, Edited by
     G. B. Schick and M. M. May. Nineteenth Yearbook of
     the National Reading Conference. Milwaukee, Wiscon-
     sin, 1970.

54. Johnson, G. R. "An Objective Method of Determining
     Reading Difficulty." <u>Journal of Educational Re-
     search</u>, 21 (April, 1930), 283-87.

55. Kane, Robert B. "The Readability of Mathematics Text-
     books Revisited." <u>Mathematics Teacher</u>, 63 (November,
     1970), 579-81.

56. Klare, G. R. "Comments on Bormuth's Readability: A New
     Approach." <u>Reading Research Quarterly</u>, 1 (Summer,
     1966), 119-25.

57. _____. "The Role of Word Frequency in Readability."
     <u>Elementary English</u>, 45 (January, 1968), 12-22.

58. _____; Rowe, P. P.; St. John, M. G.; and Stolurow,
     L. M. "Automation of the Flesch Reading Ease Read-
     ability Formula, with Various Options." <u>Reading
     Research Quarterly</u>, 4 (Summer, 1969), 550-59.

59. Lee, W. D. and Hislop, M. E. "Problems Involved in Placement of Students in a Biology Class." School Science and Mathematics, 68 (June, 1968), 473-76.

60. Lewerenz, A. S. "Measurement of the Difficulty of Reading Materials." Educational Research Bulletin, Los Angeles City Schools, 8 (March, 1929), 11-16.

61. _____. "Objective Measures for Selecting Reading Materials." Educational Research Bulletin, Los Angeles City Schools, 11 (November, 1931), 54-56.

62. Lively, B. A. and Pressey, S. L. "A Method for Measuring the 'Vocabulary Burden' of Textbooks." Educational Administration and Supervision, 9 (October, 1923), 389-98.

63. Lorge, I. "Predicting Reading Difficulty of Selections for Children." Elementary English Review, 16 (October, 1939), 229-33.

64. _____. "Word Lists as Background of Communication." Teachers College Record, 45 (May, 1944), 543-52.

65. _____. "Readability Formulae--An Evaluation." Elementary English, 26 (February, 1949), 86-95.

66. McClusky, H. Y. "A Quantitative Analysis of the Difficulty of Reading Materials." Journal of Educational Research, 28 (December, 1934), 276-82.

67. MacGinitie, W. H. and Tretiak, R. "Sentence Depth Measures as Predictors of Reading Difficulty." Reading Research Quarterly, 6 (Spring, 1971), 364-77.

68. McLaughlin, G. H. "SMOG Grading--A New Readability Formula." Journal of Reading, 12 (May, 1969), 639-46.

69. Marshall, J. S. "Comprehension and Alleged Readability of High School Physics Textbooks." Science Education, 46 (October, 1962), 335-46.

70. Michaelis, J. U. and Tyler, F. T. "A Comparison of Reading Ability and Readability." Journal of Educational Psychology, 42 (1951), 491-98.

71. Noble, C. E. "The Familiarity-Frequency Relationship,"
     Journal of Experimental Psychology, 47 (January,
     1954), 13-16.

72. Ojemann, R. H. "The Reading Ability of Parents and Fac-
     tors Associated with Reading Difficulty of Parent
     Education Materials." *University of Iowa Studies in
     Child Welfare*, 8 (1934), 11-32.

73. Ottley, L. "Readability of Science Textbooks for Grades
     Four, Five, and Six." *School Science and Mathemat-
     ics*, 65 (April, 1965), 363-66.

74. Patty, W. W. and Painter, W. I. "Improving Our Method
     of Selecting High-School Textbooks." *Journal of
     Educational Research*, 24 (June, 1931), 23-32.

75. Pauk, Walter. "A Practical Note on Readability Formu-
     las." *Journal of Reading*, 13 (December, 1969), 207-
     10.

76. Rankin, E. F. and Culhane, J. "Comparable Cloze and
     Multiple-Choice Comprehension Test Scores." *Journal
     of Reading*, 13 (December, 1969), 193-98.

77. Ruddell, Robert. "The Effect of Oral and Written Pat-
     terns of Language Structure on Reading Comprehension."
     Reading Teacher, 19 (January, 1965), 270-75.

78. Simmons, J. S. and Cox, Juanita. "New Grammar Texts for
     Secondary Schools: How Do They Read?" *Journal of
     Reading*, 15 (January, 1972), 280-85.

79. Smith, Frank. "The Readability of Junior High School
     Mathematics Textbooks." *Mathematics Teacher*, 62
     (April, 1969), 289-91.

80. _____. "The Readability of Sixth Grade Word Prob-
     lems." *School Science and Mathematics*, 71 (June,
     1971), 559-62.

81. Smith, K. J. and Heddens, J. W. "The Readability of
     Experimental Mathematics Materials." *Arithmetic
     Teacher*, 11 (October, 1964), 391-94.

82. Smith, W. L. and Mason, G. E. "Syntactic Control in
     Writing: Better Comprehension." *Journal of Read-
     ing*, 15 (February, 1972), 355-58.

83. Spache, George. "A New Readability Formula for Primary
       Grade Reading Materials," _Elementary School Journal_,
       53 (March, 1953), 410-13.

84. Stolurow, L. M. and Newman, J. R. "A Factorial Analysis
       of Objective Features of Printed Language Presumably
       Related to Reading Difficulty." _Journal of Educa-
       tional Research_, 52 (March, 1959), 243-51.

85. Strickland, R. A. _The Language of Elementary School
       Children: Its Relationship to the Language of Read-
       ing Textbooks and the Quality of Reading of Selected
       Children_, Bulletin of the School of Education,
       Bloomington, Indiana: Indiana University, July,
       1962.

86. Symyrozum, Kenneth. "The Readability of Textbooks."
       Reading Improvement, 7 (Fall, 1970), 41-45.

87. Taylor, W. L. " 'Cloze Procedure:' A New Tool for Meas-
       uring Readability." _Journalism Quarterly_, 30 (Fall,
       1953), 415-33.

88. Thorndike, E. L. "Improving the Ability to Read."
       Teachers College Record, 36 (October, November, De-
       cember 1934), 1-19, 123-44, 229-41.

89. Vogel, Mabel and Washburne, Carleton. "An Objective
       Method of Determining Grade Placement of Children's
       Reading Material." _Elementary School Journal_, 28
       (January, 1928), 373-81.

90. Weaver, W. W. and Kingston, A. J. "A Factor Analysis of
       the Cloze Procedure and Other Measures of Reading
       and Language Ability." _Journal of Communication_, 13
       (December, 1963), 252-61.

91. Wiegand, R. B. "Pittsburgh Looks at the Readability of
       Mathematics Textbooks." _Journal of Reading_, 11 (De-
       cember, 1967), 201-04.

92. Williams, D. L. "Rewritten Science Materials and Read-
       ing Comprehension." _Journal of Educational Research_,
       61 (January, 1968), 204-06.

93. Yngve, V. H. "A Model and Hypothesis for Language
       Structure." _Proceedings of the American Philosophi-
       cal Association_, 104 (1960), 444-66.

94. Yoakam, G. A. "Determining the Readability of Instructional Materials." <u>Report of the Seventh Annual Conference on Reading</u>, Pittsburgh: University of Pittsburgh, (1951), 27-33.

Unpublished Materials

95. Bear, M. V. <u>The Length of Word as an Index of Difficulty in Silent Reading</u>. Unpublished Master's Thesis, University of Chicago, 1927.

96. Felsenthal, Helen. "Readability: Computer Utilization." Paper presented at the annual meeting of the International Reading Association, Denver, Colorado, May 1-4, 1973.

97. Froese, Victor. "Cloze Readability versus the Dale-Chall Formula." Paper presented at the annual meeting of the International Reading Association, Atlantic City, New Jersey, April 19-23, 1971.

98. Gallaway, "W" "J" "A Readability Study of Selected Textbooks Used in Grades Four, Five, and Six." Sacramento State College, Sacramento, California. Unpublished Masters Thesis, 1968.

99. Harris, Albert J. "The Harris-Jacobson Primary Readability Formulas." Paper presented at the annual meeting of the International Reading Association, Denver, Colorado, May 1-4, 1973.

100. Lamb, Pose. "The Measurement of Readability: Review of Literature." Paper presented at the 1973 American Educational Research Association Convention, New Orleans, Louisiana, February 26, 1973.

101. Moe, A. J. and Arnold, R. D. "The Readability of Newbery Award Books: A Computer-Assisted Analysis." Paper presented at the 1973 American Educational Research Association Convention, New Orleans, Louisiana, February 26, 1973.

102. Morriss, E. C. and Halverson, D. "Idea Analysis Technique." Unpublished (dittoed), on file Columbia University, 1938.

Public Documents and Hearings

103. California. Reading Sub-Committee, California State
        Curriculum Commission. Justification for Adoption
        of Reading and Literature Textbooks to State Board
        of Education, by Elaine H. Stowe. Sacramento,
        Calif., 1968.

104. California. Reading and Literature Sub-Committee, Cal-
        ifornia State Curriculum Commission. New Textbooks
        in Reading and Literature Adopted for Use in Cali-
        fornia Elementary Schools--Beginning with the 1969-
        70 School Year, by Elaine H. Stowe. Sacramento,
        Calif., (Undated).

105. California. State Department of Education. Education
        Code, Volume I. Sacramento, California, 1971.

106. Hearings before the Curriculum Development and Supple-
        mental Materials Commission of the California State
        Department of Education, San Francisco, California,
        March 20, 1974.

APPENDIXES

184 Park Street
San Francisco, California
94110
September 12, 1973

Harper & Row Publishers
School Books Department
2500 Crawford Avenue
Evanston, Illinois 60201

Gentlemen:

I am a teacher in the California public schools and
am writing a dissertation. My topic is an analysis of the
readability of reading textbooks adopted by the State in
1968.

Did your company apply a readability formula to
the Harper & Row Basic Readers? If so, which one? Can
you supply me with the data?

If no readability formula was applied, on what bases
were grade levels assigned to reading texts for grades one
through grade six?

I shall appreciate your reply.

Sincerely yours,

R. W. Saunders Jr.

184 Park Street
San Francisco, California
94110
September 12, 1973

Macmillan Publishing Company
Editorial Department for School Books
866 Third Avenue
New York, N. Y. 10022

Gentlemen:

I am a teacher in the California public schools and am writing a dissertation. My topic is an analysis of the readability of reading textbooks adopted by the State in 1968.

Did your company apply a readability formula to the Macmillan and Bank Street Readers? If so, which one? Can you supply me with the data?

If no readability formula was applied, on what bases were grade levels assigned to reading texts for grades one through grade six?

I shall appreciate your reply.

Sincerely yours,

R. W. Saunders Jr.

184 Park Street
San Francisco, California
94110
September 12, 1973

Editorial Department/Open Highways Program
Scott, Foresman and Company
1900 Lake Avenue
Glenview, Illinois 60025

Gentlemen:

I am a teacher in the California public schools and
am writing a dissertation. My topic is an analysis of the
readability of reading textbooks adopted by the State in
1968.

Did your company apply a readability formula to the
Open Highways Readers? If so, which one? Can you supply me
with the data?

If no readability formula was applied, on what bases
were grade levels assigned to reading texts for grades four
through grade six?

I shall appreciate your reply.

Sincerely yours,

R. W. Saunders Jr.

Harper & Row, Publishers, Inc.

New York   Evanston   London

October 9, 1973

Mr. R. W. Saunders, Jr.
184 Park Street
San Francisco, California   94110

Dear Mr. Saunders:

Your letter of September 12 concerning the readability of
The Harper & Row Basic Reading Program has come to my
attention.

As you no doubt know, there are a variety of readability for-
mulas; these are usually applied to non-text materials in
order to discover their probable grade-level suitability. It
is our professional position that such readability figures have
serious limitations which make them unreliable for non-text
materials and completely useless for basal reading texts.

A basal reading program by definition teaches reading. At the
primary levels of The Harper & Row Basic Reading Program, for
example, every word the pupil reads is carefully taught before
he sees it in the text; each word is used in the pupil's ma-
terials many times thereafter. If one of these words is not
included on the vocabulary list for a certain readability
formula, it must be considered "unfamiliar" and it therefore
increases the difficulty level according to the formula.
However, our carefully planned teaching leads us to be certain
that such words as are used in our basal readers are completely
familiar.

Therefore, the basis on which our texts have been assigned to
grades is their instructional level. We have taken into
consideration such factors as interest, story excitement,
familiarity of situations, clarity of concepts, and simplicity
of syntax, as well as familiarity of vocabulary.

I hope this is of some help to you.

Sincerely,

Bradley Hannan

BH:s

(Mrs.) Bradley Hannan
Editor, Reading Department

MACMILLAN PUBLISHING CO., INC.
866 Third Avenue, New York, N. Y. 10022

SCHOOL DIVISION

October 3, 1973

Mr. R. W. Saunders, Jr.
184 Park Street
San Francisco, Calif. 94110

Dear Mr. Saunders:

In response to your inquiry of September 12, concerning the formula

for readability used by Macmillan, let me direct you to the work

done by Dr. Albert J. Harris on reading and vocabulary lists.

In addition to this information you will want to know that

Macmillan utilizes the readability levels devised by Chall

for most primary texts and that devised by Spache for certain

of the intermediate reading levels.

You have our good wishes for continuing success in your studies.

Sincerely,

K. O'Rourkess,

Ms. K. O'Rourke
Marketing Manager

KO'R/ss

cc: C. Boultinghouse

OPEN HIGHWAYS: Criteria for Judging Reading Difficulty

Every selection included, or considered for inclusion, in the OPEN HIGH-
WAYS books was measured by a standard readability formula--the Spache
(primary) or the Dale-Chall. Each selection chosen was placed in the
book and the section of the book for which it was adjudged suitable as
to reading difficulty, according to the formula.

The Dale-Eichholz list was used in adapting material, and wherever pos-
sible words from this list that are familiar to 67 per cent or more of
fourth-graders, for example, were substituted for words judged "difficult"
by formula.

However, the consideration of readability for a given level did not end
with the application of the formula. Such factors as the following were
also taken into account:

> level of interest
> background needed for full interpretation
> maturity of concepts
> literary form
> author's style
> paragraph length
> new vocabulary

Many linguists believe that the removal of connectives, such as and,
but, and because, in order to shorten sentences, actually increases dif-
ficulty. The connectives clue the child to cause-affect, sequence, and
analogous relationships. This, too, was carefully considered in the
evaluation of sentence length.

In some cases, a selection that checked out at the expected readability
level, according to the formula, was actually placed in a later book
(or later in a book) because of the various factors considered. For
example, Burma Boy, which appears in OPEN HIGHWAYS, Book 6, is of low
reading difficulty, according to the formula, but the concepts and foreign
settings led us to place it where it is.

To the best of our knowledge and belief, selections in OPEN HIGHWAYS are
at the level indicated for each book and section.

S-R-253
11/66

Primary Readability Worksheet

Book: *Frogs and Toads*
Publisher: *Follett Publishing Company*
Botel Readability Score: 3-2

Word Level	SAMPLE 1 pp. 8-9 Level: 3-1	SAMPLE 2 pp. 18-19 Level: 3-2	SAMPLE 3 p. 28 Level: 3-2
4th Reader & above 4+	swamp throat size match 4	crops mosquitoes common leopard 11 swamps creeks 8	toads 11111 hawks crows snakes mosquitoes 10
High 3rd Reader 3-2	wake 1	insects twelve inches 1 less 5	search insects 1 during enemies inch 6
Beg. 3rd Reader 3-1	frogs 11111 1 lake begins 1 puffs 11	frog 11111 11 helpful because rings lakes 12	grown rock earth 3
High 2nd Reader 2-2	winter ieaves holes pond sing 11 hear sure lay 1 11	hurt legs food most 1 parts only spots 1 ponds world 11	leave hop most catch fall years winter hole ground warms 10
Beg. 2nd Reader 2-1	spring 1 their 1 or balloon sign 7	which or found 1 near country grow an 8	grow an or until spring 5
1st Reader & Below	11111 11111 11111 11111 11111 11111 11111 11111 11111 11111 11111 11111 11111 1 66	11111 11111 11111 11111 11111 11111 11111 11111 11111 11111 11111 1 56	11111 11111 11111 11111 11111 11111 11111 11111 11111 11111 11111 11111 11111 1 66
Total Word Sample	100	100	100

Estimating Reading Levels of Intermediate and Secondary Materials[1]

No. of Different Words Beyond 3-2 Level	Predicted Reading Level
9-10	4th
11-12	5th
13-15	6th
16-18	7th
19-22[2]	8th
23-26[3]	9th
27-30	10th
31-33	11th
34+	12th

[1] Average difficulty means that if three 100-word samples are taken to evaluate the reading level of a book, the sample of median difficulty would be used to determine reading level by this table. For example, if in three samples you got 18, 15, 13 words appearing beyond 3-2 level, you would use 16 to predict the reading level of the book.

[2] Reader's Digest samples averaged 21 different words in the 4+ column.

[3] Time magazine samples averaged 23 different words in the 4+ column. New York Times samples averaged 28 different words in the 4+ column.

Intermediate and Secondary Worksheet

> **Book:** *George Washington, Leader of the People*
> **Publisher:** *Follett Publishing Company*
> **Botel Readability Score:** *7th*

Word Level	SAMPLE 1 p. 33 Level: 6th	SAMPLE 2 p. 131 Level: 7th	SAMPLE 3 p. 175 Level: 7th
4th Reader & above 4+	admiral allowed Creek 11 shocked grinned understandingly holidays modest Pope's business raising colony erect TOTAL WORDS: 15 DIFFERENT WORDS: 13	crop manure mixtures enrich soil tinkled grinned business evening creek flooded slave mansion Washington 1 dam mill TOTAL WORDS: 17 DIFFERENT WORDS: 16	Pope's Creek stirred merely tossing strolled general pitched yelled approval cheered Washington rounders square bases batter TOTAL WORDS: 16 DIFFERENT WORDS: 16
High 3rd Reader & Below	85	83	84
Total Word Sample	100	100	100

Graded Vocabulary List

alone 2-2
along 2-1
•aloud 3-1
already 3-2
also 3-1
always 2-1
am *p*
among 3-2
amount (s, ed, ing) 3-2
an 2-1
and *pp*
angry 2-2
animal (s) *1*
another 2-1
answer (s, ed, ing) 2-2
any 2-1
•anybody 3-2
•anyhow 3-2
•anyone 3-2
•anything 3-2
•anyway 3-2
•anywhere 3-2
apple (s) *1*
apron (s) 2-2

a

WORKSHEET FOR DETERMINING READABILITY OF 100-WORD SAMPLES

Word Level	SAMPLE 1 p.54 Level 8	SAMPLE 2 p.114 Level 7	SAMPLE 3 p.171 Level 6
4+	exploring lie wilderness painfully territory actually map original two-thirds United States America wonderland colonists westward sparkled underfoot eighteenth century this (20)	redden glanced Boston hospitality miner forgave coffee pitch-pine led weathered canvas pitched slope coffee/ merrily cans (17)	members royal merchants suma actually convinced villagers Gurkin America/ wrote Balkans described exodus Selo (15)
3^2	except plains deserts peaks bounced (5)	air taste/ pot boiling (5)	anything indeed slip (3)
3^1	forests // rich stretched ocean/ shores lakes mountains toward earth (12)	felt life week month gold cup tent tin (8)	true whole month (3)
2^2	covered // great rivers late push (7)	face filled wash even air hole pan (7)	only earning/ family magic such, wonders than/ else really everything (12)
2^1	shows highest made clean growing (5)	I'm thought maybe until fine along (6)	city paper talk letter money/ started hand people more // gone country (14)
Below 2^1	₮₦ ₮₦ ₮₦ ₮₦ ₮₦ ₮₦ ₮₦ ₮₦ ₮₦ ₮₦ / (51)	₮₦ ₮₦ ₮₦ ₮₦ ₮₦ ₮₦ ₮₦ ₮₦ ₮₦ ₮₦ ₮₦ // (57)	₮₦ ₮₦ ₮₦ ₮₦ ₮₦ ₮₦ ₮₦ ₮₦ ₮₦ ₮₦ /// (53)
	T ——— 100	——— 100	——— 100

Book: Bold Journeys Pub.: Macmillan Readability: 6

WORKSHEET FOR DETERMINING READABILITY OF 100-WORD SAMPLES

Book: Gold Journeys Pub.: Macmillan Readability:

Word Level	SAMPLE 4 p. 231 Level 7	SAMPLE 5 p. 285 Level 6	SAMPLE 6 p. 344 Level 6
4+	lengths, gaily, rail, o'clock!, approaching, western, Central!, Pacific!!!, Union!, last, decorated, railroad, rails, complete, Chinese, begun, leveling, leveled (24)	Swedish, kaffakalas, socker, i, kaffet, coffee, fa, tack, ward!, forty, tea party, unlocked, alphabet (14)	meaningful, pleasure, usually, information!, study, different, history, geography, science!, arithmetic, require, skills, suggestions, yourself, unit! (17)
3^2	engine, arrived, pair, eleven (4)	question (1)	key, special (2)
3^1	laid, crowded, nine, companies, line, final, between (7)	words, sugar!!!, given, lady, trouble, because, secrete (10)	(0)
2^2	only, lay!, needed, early, whittle, later, workmen, carrying (9)	answer!!, sailed, understand, wonder, year! (8)	most, kinds, learning, often!, learn!, facts, understand, remember (9)
2^1	more, town, people, each, brought, bed!, ties! (8)	through, miss!, best, another, after (6)	reading ₅!, something, people (9)
Below 2^1	卌卌卌卌卌 卌卌卌卌!!! (48)	卌卌卌卌卌 卌卌卌卌卌 卌卌! (61)	卌卌卌卌卌 卌卌卌卌卌 卌卌卌!!! (63)
T	100	100	100

WORKSHEET FOR DETERMINING READABILITY OF 100-WORD SAMPLES

Book: *Gold Journeys* Pub.: *Macmillan* Readability:

Word Level	SAMPLE 7 p.399 Level 5	SAMPLE 8 p.456 Level 3^2	SAMPLE 9 p.509 Level 7
4+	motion, center, robot 1, direction, Erg 11, tune, appeared, electronic, engineer, deal, basement, mechanism (15)	substitute, taught, obstacles, thus, lie (5)	immediately, vanished, blazing, abandoned, dreamed, antelopes, gazelle, Sanderson 1, sun-blazed, long-melted, forgotten, spun, faded, heat, echo, tennis, jungle, bent (19)
3^2	(0)	scold, colt 1, among, none (5)	whisper, creatures, leaping, brush (4)
3^1	signal 1, noise, trouble, pop, few (6)	lead, touches 1, logs 1, touched (6)	almost, empty, sky (3)
2^2	moving, family 1, bought, whistled 1, happened, great, changes (9)	step, such, trips, even, that, grass, whenever, learn, clowns 1, sisters, stepped, listen (13)	stood 1, ago, only, soft, left, pick, winter, sound 1, heavy, listening, remembered, moving (14)
2^1	oh, ends, starts, any 1, an, knew, both, someone 1, talked (11)	care, nothing, ready, ever (4)	off, beautiful, gone, through, then, behind (6)
Below 2^1	THL THL THL THL THL THL THL THL THL THL THL II!! (59)	THL THL THL THL THL THL THL THL THL THL THL THL THL II (67)	THL THL THL THL THL THL THL THL THL THL IIII (54)
T	100	100	100

APPLICATION OF SIGN TEST TO THREE GROUPS OF STATE-ADOPTED READING TEXTBOOKS TO DETERMINE SIGNIFICANT DIFFERENCES IN READABILITY FOR CULTURALLY DISADVANTAGED (CD), SLOW (S), AVERAGE (A), AND FAST (F) STUDENT GROUPS

Publisher's Grade Assignment 2 (2¹)

Samples	Bank Street (CD) (1)	Cols. (1-2)	Harper & Row (S&A) (2)	Cols. (2-3)	Macmillan (F) (3)	Cols. (1-3)
1	2^2	0	2^2	+	2^1	+
2	3^1	0	3^1	+	2^1	+
3	2^1	-	3^1	+	2^1	0
4	2^1	-	2^2	0	2^2	-
5	2^2	-	4	+	2^2	0
6	2^1	-	3^1	+	2^2	-
7	3^1	0	3^1	+	2^1	+
8	2^2	-	3^2	+	2^1	+
9	2^1	-	3^1	0	3^1	-
N/N	2^2	0/6	3^1	0/7	2^1	3/7
		.032**		.016**		1.00+

Publisher's Grade Assignment 1 (1²)

Samples	Bank Street (CD) (1)	Cols. (1-2)	Harper & Row (S&A) (2)	Cols. (2-3)	Macmillan (F) (3)	Cols. (1-3)
1	1^2	-	2^1	+	1^2	0
2	1^2	-	2^1	+	1^2	0
3	2^1	0	2^1	+	1^2	+
4	2^1	0	2^1	+	1^2	+
5	2^1	-	2^2	+	1^2	+
6	1^2	-	2^2	+	2^1	-
7	1^2	-	2^2	+	1^2	0
8	2^1	-	2^2	+	2^1	0
9	2^1	-	3^1	+	2^1	0
N/N	2^1	0/7	2^2	0/9	1^2	1/4
		.016**		.004*		1.00+

**$p < .05$
*$p < .01$
+H_o accepted

APPLICATION OF SIGN TEST TO THREE GROUPS OF STATE-ADOPTED READING TEXTBOOKS TO DETERMINE SIGNIFICANT DIFFERENCES IN READABILITY FOR CULTURALLY DISADVANTAGED (CD), SLOW (S), AVERAGE (A), AND FAST (F) STUDENT GROUPS

Publisher's Grade Assignment 3 (3^1)

Samples	Bank Street (CD) (1)	Cols. (1-2)	Harper & Row (S&A) (2)	Cols. (2-3)	Macmillan (F) (3)	Cols. (1-3)
1	3^1	0	3^1	–	3^2	–
2	2^2	–	3^1	–	3^2	–
3	3^1	–	3^2	+	3^1	0
4	2^2	–	3^2	+	2^2	0
5	2^2	–	3^1	–	3^2	–
6	2^2	–	3^1	0	3^1	–
7	3^1	0	3^1	–	3^2	–
8	2^2	–	3^2	+	2^1	+
9	3^1	0	3^1	–	3^2	–
$\bar{X}$ N	2^2	$\frac{0}{6}$	3^1	$\frac{3}{8}$	3^2	$\frac{1}{7}$
		.032**		.726+		.124+

Publisher's Grade Assignment 2 (2^2)

Samples	Bank Street (CD) (1)	Cols. (1-2)	Harper & Row (S&A) (2)	Cols. (2-3)	Macmillan (F) (3)	Cols. (1-3)
1	2^2	+	2^1	–	2^2	0
2	3^1	0	3^1	0	3^1	0
3	2^1	–	3^2	+	2^2	–
4	2^1	–	4	+	3^1	–
5	2^1	–	3^2	+	2^2	–
6	3^2	+	3^1	+	2^1	+
7	2^2	–	3^1	0	3^1	–
8	2^1	0	2^1	–	2^2	–
9	2^1	–	3^2	+	3^1	–
$\bar{X}$ N	2^1	$\frac{2}{7}$	3^1	$\frac{2}{7}$	2^2	$\frac{1}{7}$
		.454+		.454+		.124+

**$p < .05$
+H_0 accepted

APPLICATION OF SIGN TEST TO THREE GROUPS OF STATE-ADOPTED READING TEXTBOOKS TO DETERMINE SIGNIFICANT DIFFERENCES IN READABILITY FOR CULTURALLY DISADVANTAGED (CD), SLOW (S), AVERAGE (A), AND FAST (F) STUDENT GROUPS

Publisher's Grade Assignment (4)	Samples	Scott, Fresm (CD&S) (1)	Cols. (1-2)	Harper & Row (A) (2)	Cols. (2-3)	Macmillan (F) (3)	Cols. (1-3)
4	1	3^1	+	3^2	0	3^2	-
	2	3^2	0	3^2	0	3^2	0
	3	4	+	3^2	-	4	0
	4	3^1	-	5	-	6	-
	5	3^2	-	5	+	4	-
	6	3^2	+	3^1	-	6	-
	7	3^2	-	7	+	5	-
	8	5	-	6	+	4	+
	9	3^2	-	8	+	6	-
	N	3^2	$\frac{3}{8}$ .726+	5	$\frac{3}{7}$ 1.00+	4	$\frac{1}{7}$ .124+

Publisher's Grade Assignment	Samples	Bank Street (CD) (1)	Cols. (1-2)	Harper & Row (S&A) (2)	Cols. (2-3)	Macmillan (F) (3)	Cols. (1-3)
3 (3^2)	1	2^2	-	3^1	0	3^1	-
	2	2^2	-	3^1	-	3^2	-
	3	2^2	-	3^2	+	2^2	0
	4	5	0	5	+	4	+
	5	2^2	-	3^1	-	3^2	-
	6	4	-	6	+	5	-
	7	2^2	-	3^1	-	6	-
	8	3^1	-	6	+	3^2	-
	9	6	+	3^1	+	2^2	+
	N	2^2	$\frac{1}{8}$ .070+	3^1	$\frac{3}{8}$ .726+	3^2	$\frac{2}{8}$ .290+

+H_o accepted

APPLICATION OF SIGN TEST TO THREE GROUPS OF STATE-ADOPTED READING TEXTBOOKS TO DETERMINE SIGNIFICANT DIFFERENCES IN READABILITY FOR CULTURALLY DISADVANTAGED (CD), SLOW (S), AVERAGE (A), AND FAST (F) STUDENT GROUPS

Publisher's Grade Assignment (5)

Samples	Scott, Frsmn (CD&S) (1)	Cols. (1-2)	Harper & Row (A) (2)	Cols. (2-3)	Macmillan (F) (3)	Cols. (1-3)
1	6	−	9	+	8	−
2	5	−	8	+	7	−
3	2^2	−	7	+	6	−
4	3^1	−	6	−	7	−
5	4	+	3^1	−	6	−
6	4	0	4	−	6	−
7	3^1	−	5	0	5	−
8	5	−	7	+	3^2	+
9	4	−	8	+	7	−
$\frac{x}{N}$	4	$\frac{1}{8}$ .070+	7	$\frac{3}{8}$ .726+	6	$\frac{1}{9}$ .04**

Publisher's Grade Assignment (6)

Samples	Scott, Frsmn (CD&S) (1)	Cols. (1-2)	Harper & Row (A) (2)	Cols. (2-3)	Macmillan (F) (3)	Cols. (1-3)
1	3^2	−	4	+	3^2	0
2	7	−	8	−	9	−
3	6	−	7	−	8	−
4	6	−	9	+	6	0
5	12+	+	7	+	3^2	+
6	6	0	6	−	10	−
7	9	0	9	+	8	+
8	3^2	−	6	−	8	−
9	5	0	5	−	6	−
$\frac{x}{N}$	6	$\frac{1}{6}$ .218+	7	$\frac{4}{9}$ 1.00+	8	$\frac{2}{7}$ .454+

**$p < .05$
+H_o accepted

MATCHING STUDENTS AND BOOKS

A HANDBOOK FOR TEACHERS

- Purpose -

The purpose of this handbook is to recommend alternative methods for making instructional decisions about student placement in reading textbooks.

Prepared by: R. H. Saunders Jr., Coordinator of Reading, Berkeley Unified School District, Berkeley, California.

-- OVERVIEW OF CONTENT --

Readability levels: Using vocabulary as the variable, the
  Botel readability formula* was applied to State-adopted
  reading textbooks.

Teacher-prepared tests: Word-recognition tests were prepared
  at each reader level by sampling every nth word to con-
  struct a list of twenty vocabulary words.

  Word-opposites tests were prepared at each reader level by
  sampling words from each reader and constructing ten test
  items at each level.

Suggestions for student placement: Procedures for placement
  will be described. These have been validated by staff in
  the Berkeley Schools.

-- TABLE OF CONTENTS --

*Morton Botel. Predicting Reading Levels. Chicago:
      Follett Publishing Company, 1962.

READABILITY OF STATE-ADOPTED READING TEXTBOOKS

PUBLISHER AND TITLE

Grade	Bank Street (CD)		Harper & Row (S&A)		Macmillan (F)	
1 (1²) (1³)	Uptown, Downtown	2¹	Real and Make Believe	2¹	Lands of Pleasure	1²
			From Elephants to Eskimos	2²		
2 (2¹) (2²)	My City	2²	All Through the Year	3¹	Enchanted Gates	2¹
	Green Light Go	2¹	From Fins to Feathers	3¹	Shining Bridges	2²
3 (3¹) (3²)	City Sidewalks	2²	From Far Away Places	3¹	Better than Gold	3²
	Round the Corner	2²	From Bicycles to Boomerangs	3¹	More than Words	3²
	Scott, Frsmn. (CD&S)		(A)			
4 (4¹) (4²)	Open Highways, Bk. 4	3²	Trade Winds	3²	The Magic Word	4
			From Codes to Captains	5		
5 (5¹) (5²)	Open Highways, Bk. 5	4	Crossroads	7	Bold Journeys	6—7
			From Actors to Astronauts	5		
6 (6¹) (6²)	Open Highways, Bk. 6	6	Seven Seas	6	Into New Worlds	7-8
			From Coins to Kings	6		

-- RECOMMENDATIONS FOR STUDENT PLACEMENT --

Three categories of recommendations are explained below: (1) Minimum service to students, (2) Additional service, (3) Other alternatives.

Minimum Service

1. CHOOSE an appropriate reader series. Administer and score the word-recognition test for that series.

2. MATCH instruction level with the textbook having the same readability.

3. ASSIGN textbook and observe student's progress. Apply standards: 95--99 per cent oral reading accuracy, 75--95 per cent comprehension of silent reading.

Additional Service

1. FOLLOW Step 1 above.

2. ADMINISTER word-opposites test. Combine results of both tests.

3. MATCH instructional levels with textbook having the same readability.

4. ADMINISTER criterion-reference test which accompanies the textbook series. Evaluate results.

5. FOLLOW Step 3 under "Minimum Service."

Other Alternatives

1. CONSTRUCT word tests for other basal reader series. Use the same selection procedures for words, or administer the Botel inventory.*

2. APPLY the Botel readability formula or another formula to textbooks.

3. FOLLOW Steps 3, 4, and 5 under "Additional Service."
*Morton Botel. Botel Reading Inventory, Follett Pub.,Co., 1962.

BERKELEY UNIFIED SCHOOL DISTRICT
CURRICULUM CENTER

Harper
Word Opposites (Group) Test
(Grades 3-6)

Prepared by: Russell Saunders, Consulting Teacher

ANSWER KEY AND SCORING STANDARDS

Level		Text
A	(1)	JANET AND MARK; OUTDOORS & IN; CITY DAYS, CITY WAYS; JUST FOR FUN; AROUND THE CORNER; REAL AND MAKE BELIEVE
B	(1-3)	FROM ELEPHANTS TO ESKIMOS
C	(2-1)	ALL THROUGH THE YEAR
D	(2-2)	FROM FINS TO FEATHERS
E	(3-1)	FROM FAR AWAY PLACES
F	(3-2)	FROM BICYCLES TO BOOMERANGS
G	(4)	TRADE WINDS
H	(5)	CROSSROADS
I	(6)	SEVEN SEAS

Scoring Standards

READING LEVELS	No. of words correct out of 10	% of accuracy
Free Reading Levels (Easy: Pupil can read with profit without any teacher help.)	10 9	100% 90%
Instructional Levels (Suitable: Pupil usually needs teacher guidance for comprehension and interpretation).	8 7	80% 70%
Frustration Levels (Too difficult: Pupil cannot read with profit even with teacher help.)	65% - 0	60% - 0

N O T E

The readability of the stimulus word and the response word is stated in brackets in the answer key. Example: Look at level A, item 1
    1. Up (pp) little   down (pp) you
             ⤶Stimulus Word level   ⤶Response Word level

The remaining words in each question are of the level of the stimulus word. The [1]Botel formula was used to determine readability of all the words in this test.

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[1] Botel, Morton   *Botel Predicting Readability Levels*, Follett Publishing
                Co., Chicago, 1962.

Harper   Harper

WORD OPPOSITES TEST

Directions: Pick a word in each line   NAME _____
which means the opposite or nearly
the opposite of the numbered word.   DATE _____
Draw a line under it.
  Example: 1. no oh yes not   TEACHER _____

A	a	b	c
1. up (pp)	little	down (pp)	you
2. girl (pp)	get	play	boy (pp)
3. came (p)	good	this	went (p)
4. old (1)	door	new (1)	happy
5. day (1)	work	black	night (1)
6. town (2-1)	before	country (2-1)	right
7. show (2-1)	grow	ready	hide (2-2)
8. softly (2-2)	warm	wet	loudly (2-2)
9. earth (3-1)	sky (3-1)	lady	inside
10. master (3-2)	born	slave (+)	mad

                                        SCORE _____ %

B	a	b	c
1. gave (1)	live	baby	took (1)
2. ask (1)	open	tell (1)	children
3. plants (2-1)	use	animals (1)	together
4. does (2-1)	more	summer	doesn't (2-1)
5. learned (2-2)	drink	forgot (2-2)	pay
6. sell (2-2)	hard	winter	buy (3-1)
7. most (2-2)	answer	few (3-1)	sang
8. below (3-1)	pour	above (2-2)	slow
9. almost (3-1)	hardly (3-1)	close	rainy
10. melted (+)	separate	die	frozen (+)

                         - 4 -   SCORE _____ %

C	a	b	c	d
1. go (pp)	take	stop(p)	are	do
2. I'm (2-1)	you're (2-1)	dinner	sell	nearer
3. nothing (2-1)	crying	hasn't	something (2-1)	glad
4. stands (2-1)	high	summer	floor	sits (2-1)
5. great (2-2)	small (2-2)	moving	winter	shouted
6. early (2-2)	remembered	late (2-2)	soft	answer
7. broken (3-1)	dad's	returns	fixed (3-1)	speak
8. locks (3-2)	path	unlocks (+)	fear	arrives
9. blamed (+)	waked	vacation	lose	praised (+)
10. kid (+)	adult (+)	blazing	ceiling	frown

SCORE_____ %

D	a	b	c	d
1. sitting (2-1)	both	through	standing (2-1)	larger
2. rope (2-2)	string (2-2)	strange	poor	hurt
3. brother (2-2)	dear	won	sister (2-2)	sound
4. held (3-1)	promise	minds	whole	dropped (3-1)
5. nice (3-1)	mean (3-1)	mountains	bodies	true
6. stuck (3-2)	fear	unstuck (+)	alive	weak
7. either (+)	lies	parent	neither (+)	impossible
8. copies (+)	fancy	original (+)	dryness	defend
9. groups (+)	separated	nurse	raw	individuals (+)
10. reward (+)	penalty (+)	difference	dull	occasionally

SCORE_____ %

- 5 -

E	a	b	c	d
1. behind $^{(2-1)}$	near	before $^{(2-1)}$	more	hungry
2. quiet $^{(2-2)}$	sound	stood	grew	loud $^{(2-2)}$
3. half $^{(3-1)}$	lot	drop	handful	whole $^{(3-1)}$
4. vegetables $^{(3-1)}$	meats $^{(3-1)}$	safe	inquire	thin
5. stupid $^{(3-2)}$	explain	smart $^{(3-2)}$	favorite	choose
6. nibble $^{(3-2)}$	break	gobble $^{(3-2)}$	hollow	insist
7. policeman $^{(+)}$	peace	save	criminal $^{(+)}$	normal
8. fortune $^{(+)}$	jewels	borrower	misfortune $^{(+)}$	trinkets
9. native $^{(+)}$	foreigner $^{(+)}$	soak	tickled	inedible
10. problems $^{(+)}$	pressing	solutions $^{(+)}$	tore	healthy

SCORE_____ %

F	a	b	c	d
1. she's $^{(2-1)}$	does	he's $^{(2-1)}$	you'll	hand
2. spoke $^{(3-1)}$	reach	paw	noticed	listened $^{(2-2)}$
3. pen $^{(3-2)}$	chief	fighting	daughter	brush $^{(3-2)}$
4. boss $^{(+)}$	employee $^{(+)}$	strength	boomed	firmly
5. modern $^{(+)}$	examine	midget	antique $^{(+)}$	circular
6. exhausted $^{(+)}$	purpose	energetic $^{(+)}$	involve	charge
7. prisoner $^{(+)}$	fertile	captor $^{(+)}$	cleared	mild
8. firmly $^{(+)}$	finally	serious	weakly $^{(+)}$	vote
9. gently $^{(+)}$	roughly $^{(+)}$	glide	breeze	wobbly
10. valuable $^{(+)}$	collect	stir	prefer	worthless $^{(+)}$

SCORE _____ %

- 6 -

G	a	b	c	d
1. mean[3-1]	fairly	loving[3-1]	ocean	nine
2. Whisper[3-2]	nod	beyond	howl[3-2]	renew
3. nobody[3-2]	sir	lettuce	enter	somebody[3-2]
4. castle[3-2]	explain	cottage[3-2]	yesterday	worried
5. several[3-2]	salt	tale	none[3-2]	bundle
6. daughter[3-2]	careless	son[3-1]	insect	unless
7. expert[+]	utter	vague	amateur[+]	compute
8. cellar[+]	tunic	attic[+]	herb	leizure
9. disturb[+]	host	bade	catapult	soothe[+]
10. precious[+]	worthless[+]	hitch	violent	narrow

SCORE_____ %

H	a	b	c	d
1. moisture[+]	thicket	dryness[+]	resist	mutter
2. composite[+]	single[+]	compete	honey	jade
3. imitate[+]	increase	lizard	create[+]	envy
4. abundant[+]	ruffle	hostile	anxious	scarce[+]
5. tender[+]	harsh[+]	trickle	rubble	extinct
6. wither[+]	wit	flourish[+]	equip	resist
7. foreign[+]	district	majesty	domestic[+]	fossil
8. unique[+]	urban	similar[+]	chant	· lute
9. reprove[+]	disrupt	justice	request	praise[+]
10. perplex[+]	clarify[+]	stammer	pearl	greed

SCORE _____ %

- 7 -

I	a	b	c	d
1. calm (+)	tradition	hysterical (+)	appraise	cord
2. sullen (+)	summon	herb	amiable (+)	robust
3. temporary (+)	utter	tension	permanent (+)	tow
4. delicate (+)	rough (+)	drone	majesty	robot
5. horizontal (+)	miracle	ancestor	hoax	vertical (+)
6. advantage (+)	aloft	obstacle (+)	logic	longitude
7. fantastic (+)	depot	finance	ordinary (+)	navigate
8. defend (+)	emanate	duct	narrate	attack (+)
9. praise (+)	port	reproach (+)	gesture	kin
10. ascent (+)	jade	discus	descent (+)	vise

SCORE_____ %

- 8 -

Harper   Harper

WORD OPPOSITES TEST

Directions: Pick a word in each line
which means the opposite or nearly
the opposite of the numbered word.
Draw a line under it.
  Example: 1. no oh yes not

NAME _____

DATE _____

TEACHER _____

A	a	b	c
1. up	little	down	you
2. girl	get	play	boy
3. came	good	this	went
4. old	door	new	happy
5. day	work	black	night
6. town	before	country	right
7. show	grow	ready	hide
8. softly	warm	wet	loudly
9. earth	sky	lady	inside
10. master	born	slave	mad

SCORE _____ %

B	a	b	c
1. gave	live	baby	took
2. ask	open	tell	children
3. plants	use	animals	together
4. does	more	summer	doesn't
5. learned	drink	forgot	pay
6. sell	hard	winter	buy
7. most	answer	few	sang
8. below	pour	above	slow
9. almost	hardly	close	rainy
10. melted	separate	die	frozen

- 9 -

SCORE _____ %

C	a	b	c	d
1. go	take	stop	are	do
2. I'm	you're	dinner	sell	nearer
3. nothing	crying	hasn't	something	glad
4. stands	high	summer	floor	sits
5. great	small	moving	winter	shouted
6. early	remembered	late	soft	answer
7. broken	dad's	returns	fixed	speak
8. locks	path	unlocks	fear	arrives
9. blamed	waked	vacation	lose	praised
10. kid	adult	blazing	ceiling	frown

SCORE_____%

D	a	b	c	d
1. sitting	both	through	standing	larger
2. rope	string	strange	poor	hurt
3. brother	dear	won	sister	sound
4. held	promise	minds	whole	dropped
5. nice	mean	mountains	bodies	true
6. stuck	fear	unstuck	alive	weak
7. either	lies	parent	neither	impossible
8. copies	fancy	original	dryness	defend
9. groups	separated	nurse	raw	individuals
10. reward	penalty	difference	dull	occasionally

SCORE_____%

- 10 -

E	a	b	c	d
1. behind	near	before	more	hungry
2. quiet	sound	stood	grew	loud
3. half	lot	drop	handful	whole
4. vegetables	meats	safe	inquire	thin
5. stupid	explain	smart	favorite	choose
6. nibble	break	gobble	hollow	insist
7. policeman	peace	save	criminal	normal
8. fortune	jewels	borrower	misfortune	trinkets
9. native	foreigner	soak	tickled	inedible
10. problems	pressing	solutions	tore	healthy

SCORE_____%

F	a	b	c	d
1. she's	does	he's	you'll	hand
2. spoke	reach	paw	noticed	listened
3. pen	chief	fighting	daughter	brush
4. boss	employee	strength	boomed	firmly
5. modern	examine	midget	antique	circular
6. exhausted	purpose	energetic	involve	charge
7. prisoner	fertile	captor	cleared	mild
8. firmly	finally	serious	weakly	vote
9. gently	roughly	glide	breeze	wobbly
10. valuable	collect	stir	prefer	worthless

SCORE _____ %

- 11 -

G	a	b	c	d
1. mean	fairly	loving	ocean	nine
2. Whisper	nod	beyond	howl	renew
3. nobody	sir	lettuce	enter	somebody
4. castle	explain	cottage	yesterday	worried
5. several	salt	tale	none	bundle
6. daughter	careless	son	insect	unless
7. expert	utter	vague	amateur	compute
8. cellar	tunic	attic	herb	leizure
9. disturb	host	bade	catapult	soothe
10. precious	worthless	hitch	violent	narrow

SCORE_____ %

H	a	b	c	d
1. moisture	thicket	dryness	resist	mutter
2. composite	single	compete	honey	jade
3. imitate	increase	lizard	create	envy
4. abundant	ruffle	hostile	anxious	scarce
5. tender	harsh	trickle	rubble	extinct
6. wither	wit	flourish	equip	resist
7. foreign	district	majesty	domestic	fossil
8. unique	urban	similar	chant	lute
9. reprove	disrupt	justice	request	praise
10. perplex	clarify	stammer	pearl	greed

SCORE _____ %

- 12 -

I	a	b	c	d
1. calm	tradition	hysterical	appraise	cord
2. sullen	summon	herb	amiable	robust
3. temporary	utter	tension	permanent	tow
4. delicate	rough	drone	majesty	robot
5. horizontal	miracle	ancestor	hoax	vertical
6. advantage	aloft	obstacle	logic	longitude
7. fantastic	depot	finance	ordinary	navigate
8. defend	emanate	duct	narrate	attack
9. praise	port	reproach	gesture	kin
10. ascent	jade	discus	descent	vise

SCORE_____%

BERKELEY UNIFIED SCHOOL DISTRICT
CURRICULUM CENTER

MacMillan

Word Opposites (Group) Test
(Grades 3-6)

ANSWER KEY AND SCORING STANDARDS

Level	Text
A (1)	OPENING BOOKS, A MAGIC BOX THINGS YOU SEE, WORLDS OF WONDER LANDS OF PLEASURE
B (2-1)	ENCHANTED GATES
C (2-2)	SHINING BRIDGES
D (3-1)	BETTER THAN GOLD
E (3-2)	MORE THAN WORDS
F (4)	THE MAGIC WORD
G (5)	BOLD JOURNEYS
H (6)	INTO NEW WORLDS

Scoring Standards

READING LEVELS	No. of words correct out of 10	% of accuracy
Free Reading Levels		
(Easy: Pupil can read	10	100%
with profit without	9	90%
any teacher help.)		
Instructional Levels		
(Suitable: Pupil usually	8	80%
needs teacher guidance for	7	70%
comprehension and inter-		
pretation).		
Frustration Levels		
(Too difficult: Pupil	65% - 0	60% - 0
cannot read with profit		
even with teacher help.)		

Prepared by: Russell Saunders, Consulting Teacher

MacMILLAN   MacMILLAN
W O R D   O P P O S I T E S   T E S T

Directions: Pick a word in each line   NAME_____
which means the opposite or nearly
the opposite of the numbered word.   DATE_____
Draw a line under it.
  Example: 1. no oh <u>yes</u> not   TEACHER_____

A	a	b	c
1. come	with	<u>go</u>	up
2. little	will	you	<u>big</u>
3. then	soon	find	<u>now</u>
4. night	black	<u>day</u>	sleep
5. sits	right	best	<u>stands</u>
6. into	away	<u>out</u>	run
7. took	from	tell	<u>gave</u>
8. over	after	back	<u>under</u>
9. hard	<u>soft</u>	hurt	wet
10. yell	thief	<u>whisper</u>	float

SCORE _____ %

B	a	b	c	d
1. coming	getting	<u>going</u>	riding	our
2. under	<u>over</u>	opened	fast	some
3. tall	gone	keep	<u>head</u>	started
4. hungry	cried	afraid	glad	<u>full</u>
5. pulled	<u>pushed</u>	poor	sure	kept
6. soft	ice	<u>hard</u>	wait	above
7. left	only	real	<u>right</u>	angry
8. secret	held	<u>known</u>	goodness	unhappy
9. smart	top	fix	husband	<u>stupid</u>
10. shiny	<u>dull</u>	fallen	ugly	frowned

- 15 -

SCORE _____ %

C		a	b	c	d
1.	front	buy	<u>behind</u>	large	nothing
2.	park	small	dark	rode	<u>drive</u>
3.	loud	sound	bad	supper	<u>quiet</u>
4.	passed	<u>followed</u>	stood	above	move
5.	bottom	beginning	<u>top</u>	plenty	low
6.	lifted	stretched	<u>dropped</u>	lazy	toward
7.	suddenly	chase	noisy	<u>slowly</u>	wild
8.	huge	terrible	curled	<u>tiny</u>	awful
9.	anybody	<u>nobody</u>	somebody	stared	pointed
10.	truth	truely	<u>lies</u>	falsely	different

SCORE _____ %

D		a	b	c	d
1.	young	carried	<u>old</u>	queer	sorry
2.	lead	against	child	<u>follow</u>	lady
3.	broken	course	promise	<u>whole</u>	smooth
4.	weak	heart	<u>strong</u>	daughter	wander
5.	enters	silently	spread	<u>leaves</u>	narrow
6.	raised	heavier	<u>lowered</u>	further	split
7.	beggar	pioneers	haul	<u>giver</u>	chuckled
8.	future	easier	<u>past</u>	forward	happily
9.	fresh	<u>stale</u>	usual	dining	crispy
10.	ashore	evening	<u>afloat</u>	strode	surface

SCORE _____ %

E	a	b	c	d
1. retreat	defeated	liberty	advance	opposite
2. honor	disgrace	memorial	statue	defend
3. calmly	perfect	inward	excitedly	shoved
4. accept	ourselves	metal	superman	reject
5. cruel	tender	flushed	meant	bouquet
6. entrance	warrior	exit	office	heliport
7. miserable	depend	proper	comfortable	serious
8. wrinkled	yourselves	pressed	uniform	military
9. strength	carrots	realize	expensive	weakness
10. wealth	poverty	freedom	success	usable

SCORE _____ %

F	a	b	c	d
1. capture	native	release	amaze	foresight
2. waste	entire	belief	pinch	save
3. mild	support	tenderness	husky	harsh
4. firm	feeble	strict	mood	unfair
5. regular	somewhat	odd	venture	paddle
6. increase	tradition	lessen	spout	banner
7. tough	twitch	pretend	frail	lei
8. dent	cane	rifle	bulge	shrug
9. sloppy	neat	windshield	juggler	mound
10. patient	clue	restless	cricket	editor

SCORE _____ %

- 17 -

G	a	b	c	d
1.	majority	mammoth	_minority_	occur	force
2.	expand	patience	inspect	_contract_	reserve
3.	provide	energy	elect	_deny_	stubborn
4.	tense	shock	_relaxed_	growl	limit
5.	attempt	quality	product	_avoid_	accident
6.	hollow	cannon	_solid_	disk	beacon
7.	dense	cleat	convince	_sparse_	butler
8.	spectator	season	outfit	_performer_	curse
9.	perish	_survive_	famine	trance	gait
10.	coil	civics	_unwind_	granite	jog

SCORE _____ %

H	a	b	c	d
1.	infinite	igneous	_limited_	gauge	evolve
2.	handicap	_advantage_	lithe	synthetic	wretched
3.	trivial	negative	electrode	_important_	careen
4.	critical	subtle	conservative	dilute	_approving_
5.	romantic	_practical_	muzzle	precise	isolate
6.	obstruct	forge	_assist_	anticipate	palpitate
7.	ascend	astern	traveler	_descend_	haven
8.	popular	outrageous	_disliked_	accord	propel
9.	certain	climax	cylinder	shutter	_doubtful_
10.	distribute	_gather_	gauge	beaker	radar

SCORE _____ %

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MacMILLAN   MacMILLAN

W O R D   O P P O S I T E S   T E S T

Directions: Pick a word in each line
which means the opposite or nearly
the opposite of the numbered word.
Draw a line under it.
    Example: 1. no oh yes not

NAME_____

DATE_____

TEACHER_____

A	a	b	c
1. come	with	go	up
2. little	will	you	big
3. then	soon	find	now
4. night	black	day	sleep
5. sits	right	best	stands
6. into	away	out	run
7. took	from	tell	gave
8. over	after	back	under
9. hard	soft	hurt	wet
10. yell	thief	whisper	float

SCORE _____ %

B	a	b	c	d
1. coming	getting	going	riding	our
2. under	over	opened	fast	some
3. tail	gone	keep	head	started
4. hungry	cried	afraid	glad	full
5. pulled	pushed	poor	sure	kept
6. soft	ice	hard	wait	above
7. left	only	real	right	angry
8. secret	held	known	goodness	unhappy
9. smart	top	fix	husband	stupid
10. shiny	dull	fallen	ugly	frowned

- 19 -

SCORE _____ %

C	a	b	c	d
1. front	buy	behind	large	nothing
2. park	small	dark	rode	drive
3. loud	sound	bad	supper	quiet
4. passed	followed	stood	above	move
5. bottom	beginning	top	plenty	low
6. lifted	stretched	dropped	lazy	toward
7. suddenly	chase	noisy	slowly	wild
8. huge	terrible	curled	tiny	awful
9. anybody	nobody	somebody	stared	pointed
10. truth	truely	lies	falsely	different

SCORE _____ %

D	a	b	c	d
1. young	carried	old	queer	sorry
2. lead	against	child	follow	lady
3. broken	course	promise	whole	smooth
4. weak	heart	strong	daughter	wander
5. enters	silently	spread	leaves	narrow
6. raised	heavier	lowered	further	split
7. beggar	pioneers	haul	giver	chuckled
8. future	easier	past	forward	happily
9. fresh	stale	usual	dining	crispy
10. ashore	evening	afloat	strode	surface

SCORE _____ %

- 20 -

E	a	b	c	d
1. retreat	defeated	liberty	advance	opposite
2. honor	disgrace	memorial	statue	defend
3. calmly	perfect	inward	excitedly	shoved
4. accept	ourselves	metal	superman	reject
5. cruel	tender	flushed	meant	bouquet
6. entrance	warrior	exit	office	heliport
7. miserable	depend	proper	comfortable	serious
8. wrinkled	yourselves	pressed	uniform	military
9. strength	carrots	realize	expensive	weakness
10. wealth	poverty	freedom	success	usable

SCORE _____ %

F	a	b	c	d
1. capture	native	release	amaze	foresight
2. waste	entire	belief	pinch	save
3. mild	support	tenderness	husky	harsh
4. firm	feeble	strict	mood	unfair
5. regular	somewhat	odd	venture	paddle
6. increase	tradition	lessen	spout	banner
7. tough	twitch	pretend	frail	lei
8. dent	cane	rifle	bulge	shrug
9. sloppy	neat	windshield	juggler	mound
10. patient	clue	restless	cricket	editor

SCORE _____ %

G	a	b	c	d
1. majority	mammoth	minority	occur	force
2. expand	patience	inspect	contract	reserve
3. provide	energy	elect	deny	stubborn
4. tense	shock	relaxed	growl	limit
5. attempt	quality	product	avoid	accident
6. hollow	cannon	solid	disk	beacon
7. dense	cleat	convince	sparse	butler
8. spectator	season	outfit	performer	curse
9. perish	survive	famine	trance	gait
10. coil	civics	unwind	granite	jog

SCORE _____ %

H	a	b	c	d
1. infinite	igneous	limited	gauge	evolve
2. handicap	advantage	lithe	synthetic	wretched
3. trivial	negative	electrode	important	careen
4. critical	subtle	conservative	dilute	approving
5. romantic	practical	muzzle	precise	isolate
6. obstruct	forge	assist	anticipate	palpitate
7. ascend	astern	traveler	descend	haven
8. popular	outrageous	disliked	accord	propel
9. certain	climax	cylinder	shutter	doubtful
10. distribute	gather	gauge	beaker	radar

SCORE _____ %

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BERKELEY UNIFIED SCHOOL DISTRICT
Curriculum Center
841 Folger

W O R D   R E C O G N I T I O N   T E S T   C A R D S

F O R

	Pages
Bank Street Readers	1 - 3
Harper & Row Basic Readers	4 - 6
The MacMillan Reading Program (Harris)	7 - 9
Scott, Foresman OPEN HIGHWAYS Readers	10

GENERAL DIRECTIONS

The word cards in this booklet are to be read by the pupil.

Record pupil responses on a separate WORD RECOGNITION SCORING SHEET. Use a separate sheet for each pupil tested.

SCORING DIRECTIONS

Refer to the directions on the WORD RECOGNITION SCORING SHEET for directions for recording pupil responses.

Determine reading levels described below by using the following percentage scores:

	No. of words correct out of 20	% of accuracy
FREE READING LEVELS (Easy: Pupil can read with profit without any teacher help.)	20	100%
	19	95%
INSTRUCTIONAL LEVELS (Suitable: Pupil usually needs teacher guidance for comprehension and inter- pretation.)	18	90%
	17	85%
	16	80%
	15	75%
	14	70%
FRUSTRATION LEVELS (Too difficult: Pupil cannot read with profit even with teacher help.)	13 - 0	65% - 0%

BANK   BANK   BANK

W O R D   R E C O G N I T I O N   T E S T - - (Card I)

A	B	C
house	but	faster
street	me	lap
go	his	first
they	drill	place
school	rained	opened
on	grandmother	noisy
morning	said	faraway
say	cat	things
who	gave	door
is	win	tried
at	your	black
she	no	today
have	fell	each
yes	walked	safe
stop	way	we're
ice cream	lived	backward
trucks	snowplow	alike
fireman	wanted	share
birds	highways	hole
free	rolled	bread

BANK   BANK   BANK

WORD RECOGNITION TEST - -(Card 2)

D	E	F
soon	quite	closes
while	which	core
animals	tomatoes	bother
bed	mouth	burning
nine	scare	wrinkled
terrible	licked	person
friendly	squeaky	bank
fish	babies	goodness
castle	palace	rhymes
roared	deep	future
teeth	seal	happiness
cracks	brought	tasted
snowflakes	suddenly	needle
loose	rode	shopped
stay	been	gulls
mice	butterflies	fairies
games	returning	wedding
cloud	traveler	wandering
crazy	added	fifty
grade	stony	branches

BANK   BANK   BANK

WORD RECOGNITION TEST - - (Card 3)

G

shivered

forts

minute

tag

screens

pigeons

also

exactly

ink

shrill

pilot

pair

flipped

fair

stall

creep

starve

muddy

tease

slapped

HARPER   HARPER   HARPER

WORD RECOGNITION TEST - - (Card 1)

A	B	C
and	play	him
here	now	girl
I	do	of
can	red	dime
go	going	give
the	at	skates
socks	too	bed
in	morning	why
two	said	pond
Mother	your	brown
Daddy	will	sun
with	big	by
to	what	legs
you	he	colt
want	did	sheep
have	fly	feel
like	old	door
good	town	talk
a	someone	football
make	tell	show

HARPER   HARPER   HARPER

WORD   RECOGNITION TEST - - (Card 2)

D	E	F
hark	teacher	soon
around	each	doghouse
start	names	hero
called	ourselves	wrong
wanted	stripes	lake
find	arithmetic	locks
zoo	been	turn
when	finger	pays
himself	nails	kid
trip	drink	goal
young	believe	slippers
warm	stopped	breakfast
peeped	always	gave
an	flowers	piled
under	store	whiskers
dry	food	hope
patted	land	danced
spell	five	tulips
black	leave	since
knew	lamps	prize

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HARPER   HARPER   HARPER

WORD   RECOGNITION TEST -- (Card 3)

G	H	I
size	really	gavel
nurse	cottage	stir
both	exclaimed	noticed
penny	toward	lap
often	Mama	depend
state	thought	microbes
blocks	wiggled	twisted
fur	custom	freezer
heard	tiger	located
spends	lots	graceful
antlers	hoops	served
brother	drown	borders
sum	kettle	seaport
reason	hearts	suggested
buzzed	janitor	frame
castle	tore	paw
met	protecting	pebbles
shall	creaking	tug
waltz	carving	domes
impossible	magazines	throat

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MacMillan   MacMillan   MacMillan

WORD RECOGNITION TEST - - (Card I)

A	B	C
and	up	we
rides	here	picnic
who	go	good
can	didn't	bounce
with	something	run
policemen	ran	oh
can't	come	tricks
the	you	bus
play	Daddy	man
said	comes	talk
I	for	my
ball	makes	light
get	like	three
want	yellow	just
to	looks	looked
cowboys	yes	from
a	see	hurry
bike	boy	word
not	green	flew
is	stop	peanuts

MacMillan   MacMillan   MacMillan

WORD RECOGNITION TEST - - (Card 2)

D	E	F
street	getting	printing
liked	outside	watched
cry	keep	everybody
six	oldest	fourth
yelling	library	voice
together	I'm	playful
puppy	sugar	language
next	kite	squirrel
came	hobby	reached
last	soft	group
old	tail	pouring
bone	cellar	awful
fair	goodness	wrong
mad	dance	acting
people	popped	post
horse	spring	paw
noise	almost	often
mountain	fires	tracks
meow	left	snake
kind	trip	bottom

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MacMillan   MacMillan   MacMillan

WORD RECOGNITION TEST - - (Card 3)

G	H
attention	electric
board	approve
minute	rushed
farther	calmly
sighed	alphabet
dislike	tangled
trotted	teammates
cottages	glanced
gentle	raccoons
explode	recognize
supports	slanted
invented	entrance
haul	seize
marry	trout
cider	guards
saucepan	amazing
gowns	mistakes
fruit	harbor
queer	protect
immediately	eagle

OPEN HIGHWAYS   OPEN HIGHWAYS   OPEN HIGHWAYS

WORD RECOGNITION TEST - - (Card I)

A	B	C
rack	dumped	messy
bottle cap	toothpick	sparkling
horsecars	fought	bathrobe
fireworks	jailer	press
bet	stroked	thief
grip	tend	uncombed
pal	lack	shaggy
steep	frog	remained
pill	wherever	eyelashes
sparks	creep	armored
failed	sink	team
kingdom	frozen	resist
fluff	main	dinosaurs
slide	drum	dozen
frame	beaks	clutching
date	hem	correct
sport	fin	strictly
fed	hike	concerned
sneeze	cannon	spoiled
rose	pest	reptiles

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BANK   BANK   BANK

WORD RECOGNITION SCORING SHEET

Directions: Use the following codes in response columns:

Pupil _____

correct word   ✓   Date _____

mispronunciation)
substitution   ) (write word said)   Instructional Levels _____
refusal (after 5 seconds)   R
                                        _____

To get percentage of accuracy
multiply number of errors by 5
and deduct total from 100.   Teacher _____

A (Pre-Primer)   ## B (Primer)   ## C (First)

1. house	_____	but	_____	faster	_____
2. street	_____	me	_____	lap	_____
3. go	_____	his	_____	first	_____
4. they	_____	drill	_____	place	_____
5. school	_____	rained	_____	opened	_____
6. on	_____	grandmother	_____	noisy	_____
7. morning	_____	said	_____	faraway	_____
8. say	_____	cat	_____	things	_____
9. who	_____	gave	_____	door	_____
10. is	_____	win	_____	tried	_____
11. at	_____	your	_____	black	_____
12. she	_____	no	_____	today	_____
13. have	_____	fell	_____	each	_____
14. yes	_____	walked	_____	safe	_____
15. stop	_____	way	_____	we're	_____
16. ice cream	_____	lived	_____	backward	_____
17. trucks	_____	snowplow	_____	alike	_____
18. fireman	_____	wanted	_____	share	_____
19. birds	_____	highways	_____	hole	_____
20. free	_____	rolled	_____	bread	_____

Score _____ %   Score _____ %   Score _____ %

In the City   Around the City   Uptown, Downtown

People Read

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BANK   BANK   BANK

D (Second - 1)		E (Second - 2)		F (Third - 1)	
1. soon	_____	quite	_____	closes	_____
2. while	_____	which	_____	core	_____
3. animals	_____	tomatoes	_____	bother	_____
4. bed	_____	mouth	_____	burning	_____
5. nine	_____	scare	_____	wrinkled	_____
6. terrible	_____	licked	_____	person	_____
7. friendly	_____	squeaky	_____	bank	_____
8. fish	_____	babies	_____	goodness	_____
9. castle	_____	palace	_____	rhymes	_____
10. roared	_____	deep	_____	future	_____
11. teeth	_____	seal	_____	happiness	_____
12. cracks	_____	brought	_____	tasted	_____
13. snowflakes	_____	suddenly	_____	needle	_____
14. loose	_____	rode	_____	shopped	_____
15. stay	_____	been	_____	gulls	_____
16. mice	_____	butterflies	_____	fairies	_____
17. games	_____	returning	_____	wedding	_____
18. cloud	_____	traveler	_____	wandering	_____
19. crazy	_____	added	_____	fifty	_____
20. grade	_____	stony	_____	branches	_____

Score_____%   Score_____%   SCORE_____%

My City   Green Light, Go   City Sidewalks

BANK   BANK   BANK

G (Third - 2)

1. shivered _____

2. forts   _____

3. minute   _____

4. tag   _____

5. screens   _____

6. pigeons   _____

7. also   _____

8. exactly   _____

9. ink   _____

10. shrill   _____

11. pilot   _____

12. pair   _____

13. flipped   _____

14. fair   _____

15. stall   _____

16. creep   _____

17. starve   _____

18. muddy   _____

19. tease   _____

20. slapped   _____

SCORE_____ %

<u>Round the Corner</u>

- 36 -

HARPER   HARPER   HARPER

WORD RECOGNITION SCORING SHEET

Directions: Use the following codes in response columns:

correct word   ✓

mispronunciation)
substitution   ) (write word said)
refusal (after 5 seconds)   R

To get percentage of accuracy multiply number of errors by 5 and deduct total from 100.

Pupil _____

Date _____

Instructional Levels _____

_____

Teacher _____

A (Pre-Primers I and 2)

1. and   _____
2. here   _____
3. I   _____
4. can   _____
5. go   _____
6. the   _____
7. socks   _____
8. in   _____
9. two   _____
10. Mother   _____
11. Daddy   _____
12. with   _____
13. to   _____
14. you   _____
15. want   _____
16. have   _____
17. like   _____
18. good   _____
19. a   _____
20. make   _____

Score

_____ %

Janet and Mark

Outdoors and In

B (Pre-Primers 3 and 4)

play   _____
now   _____
do   _____
red   _____
going   _____
at   _____
too   _____
morning   _____
said   _____
your   _____
will   _____
big   _____
what   _____
he   _____
did   _____
fly   _____
old   _____
town   _____
someone   _____
tell   _____

Score

_____ %

City Days, City Ways

Just for Fun

C (Primer)

him   _____
girl   _____
of   _____
dime   _____
give   _____
skates   _____
bed   _____
why   _____
pond   _____
brown   _____
sun   _____
by   _____
legs   _____
colt   _____
sheep   _____
feel   _____
door   _____
talk   _____
football   _____
show   _____

Score

_____ %

Around the Corner

HARPER   HARPER   HARPER

D (First-1)   E (First -2)   F (Second-1)

1.	hark	_____	teacher	_____	soon	_____
2.	around	_____	each	_____	doghouse	_____
3.	start	_____	names	_____	hero	_____
4.	called	_____	ourselves	_____	wrong	_____
5.	wanted	_____	stripes	_____	lake	_____
6.	find	_____	arithmetic	_____	locks	_____
7.	zoo	_____	been	_____	turn	_____
8.	when	_____	finger	_____	pays	_____
9.	himself	_____	nails	_____	kid	_____
10.	trip	_____	drink	_____	goal	_____
11.	young	_____	believe	_____	slippers	_____
12.	warm	_____	stopped	_____	breakfast	_____
13.	peeped	_____	always	_____	gave	_____
14.	an	_____	flowers	_____	piled	_____
15.	under	_____	store	_____	whiskers	_____
16.	dry	_____	food	_____	hope	_____
17.	patted	_____	land	_____	danced	_____
18.	spell	_____	five	_____	tulips	_____
19.	black	_____	leave	_____	since	_____
20.	knew	_____	lamps	_____	prize	_____

Score _____ %   Score _____ %   Score _____ %

Real and Make-Believe   From Elephants to   All Through the Year
                          Eskimos

HARPER   HARPER   HARPER

G (Second-2)   H (Third-I)   I (Third-2)

1.	size		really		gavel	
2.	nurse		cottage		stir	
3.	both		exclaimed		noticed	
4.	penny		toward		lap	
5.	often		Mama		depend	
6.	state		thought		microbes	
7.	blocks		wiggled		twisted	
8.	fur		custom		freezer	
9.	heard		tiger		located	
10.	spends		lots		graceful	
11.	antlers		hoops		served	
12.	brother		drown		borders	
13.	sum		kettle		seaport	
14.	reason		hearts		suggested	
15.	buzzed		janitor		frame	
16.	castle		tore		paw	
17.	met		protecting		pebbles	
18.	shall		creaking		tug	
19.	waltz		carving		domes	
20.	impossible		magazines		throat	

Score _____%   SCORE_____%   SCORE_____%

From Fins to Feathers   From Faraway Places   From Bicycles to Boomerangs

MacMillan   MacMillan   MacMillan

WORD RECOGNITION SCORING SHEET

Directions: Use the following codes in
response columns:

correct word   ✓   Date _____

mispronunciation)
substitution   ) (write word said)   Instructional Levels _____
refusal (after 5 seconds)   R
                                            _____
To get percentage of accuracy
multiply number of errors by 5   Teacher _____
and deduct total from 100.

Pupil _____

A (Pre-Primer I)   B (Pre-Primers 2 and 3)   C (Primer)

1.	and	_____	up	_____	we	_____
2.	rides	_____	here	_____	picnic	_____
3.	who	_____	go	_____	good	_____
4.	can	_____	didn't	_____	bounce	_____
5.	with	_____	something	_____	run	_____
6.	policemen	_____	ran	_____	oh	_____
7.	can't	_____	come	_____	tricks	_____
8.	the	_____	you	_____	bus	_____
9.	play	_____	Daddy	_____	man	_____
10.	said	_____	comes	_____	talk	_____
11.	I	_____	for	_____	my	_____
12.	ball	_____	makes	_____	light	_____
13.	get	_____	like	_____	three	_____
14.	want	_____	yellow	_____	just	_____
15.	to	_____	looks	_____	looked	_____
16.	cowboys	_____	yes	_____	from	_____
17.	a	_____	see	_____	hurry	_____
18.	bike	_____	boy	_____	word	_____
19.	not	_____	green	_____	flew	_____
20.	is	_____	stop	_____	peanuts	_____

Score _____ %   **Score** _____ %   **Score** _____ %

Opening Books   A Magic Box   Worlds of Wonder
                         Things You See

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MacMillan	MacMillan	MacMillan
D(First - I)	**E (Second-I)**	**F (Second-2)**

	D(First - I)		E (Second-I)		F (Second-2)	
1.	street		getting		printing	
2.	liked		outside		watched	
3.	cry		keep		everybody	
4.	six		oldest		fourth	
5.	yelling		library		voice	
6.	together		I'm		playful	
7.	puppy		sugar		language	
8.	next		kite		squirrel	
9.	came		hobby		reached	
10.	last		soft		group	
11.	old		tail		pouring	
12.	bone		cellar		awful	
13.	fair		goodness		wrong	
14.	mad		dance		acting	
15.	people		popped		post	
16.	horse		spring		paw	
17.	noise		almost		often	
18.	mountain		fires		cracks	
19.	meow		left		snake	
20.	kind		trip		bottom	

Score _____ %   **Score** _____ %   **Score** _____ %

Lands of Pleasure   Enchanted Gates   Shining Bridges

MacMillan   MacMillan   MacMillan

G (Third-I)   ## H (Third-2)

1.	attention	_____	electric	_____
2.	board	_____	approve	_____
3.	minute	_____	rushed	_____
4.	farther	_____	calmly	_____
5.	sighed	_____	alphabet	_____
6.	dislike	_____	tangled	_____
7.	trotted	_____	teammates	_____
8.	cottages	_____	glanced	_____
9.	gentle	_____	raccoons	_____
10.	explode	_____	recognize	_____
11.	supports	_____	slanted	_____
12.	invented	_____	entrance	_____
13.	haul	_____	seize	_____
14.	marry	_____	trout	_____
15.	cider	_____	guards	_____
16.	saucepan	_____	amazing	_____
17.	gowns	_____	mistakes	_____
18.	fruit	_____	harbor	_____
19.	queer	_____	protect	_____
20.	immediately	_____	eagle	_____

Score _____%   ## Score _____%

Better than Gold   More than Words

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OPEN HIGHWAYS
Book 4

OPEN HIGHWAYS
Book 4

OPEN HIGHWAYS
Book 4

WORD RECOGNITION SCORING SHEET

Directions: Use the following codes in response columns:

correct word ✓

misprounciation)
substitution) (write word said)
refusal (after 5 seconds) R

To get percentage of accuracy multiply number of errors by 5 and deduct total from 100.

Pupil _____

Date _____

Instructional Levels _____

Teacher _____

A		**B**		**C**	
1. rack	____	dumped	____	messy	____
2. bottle cap	____	toothpick	____	sparkling	____
3. horsecars	____	fought	____	bathrobe	____
4. fireworks	____	jailer	____	press	____
5. bet	____	stroked	____	thief	____
6. grip	____	tend	____	uncombed	____
7. pal	____	lack	____	shaggy	____
8. steep	____	frog	____	remained	____
9. pill	____	wherever	____	eyelashes	____
10. sparks	____	creep	____	armored	____
11. failed	____	sink	____	team	____
12. kingdom	____	frozen	____	resist	____
13. fluff	____	main	____	dinosaurs	____
14. slide	____	drum	____	dozen	____
15. frame	____	beaks	____	clutching	____
16. date	____	hem	____	correct	____
17. sport	____	fin	____	strictly	____
18. fed	____	hike	____	concerned	____
19. sneeze	____	cannon	____	spoiled	____
20. rose	____	pest	____	reptiles	____

Score ____ %
(Sections 1 and 2
Pages 9–139
R.L. 2-1–2-2)

Score ____ %
(Sections 3–5
Pages 140–371
R.L. 3-1–3-2)

Score ____ %
(Section 6
Pages 372–457
R.L. 3-2–4-1)

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TEST PAGES IN THIS <u>HANDBOOK</u> HAVE BEEN REDUCED. FOR FULL-
SIZE COPIES WRITE TO: Russell W. Saunders, Jr., Coordinator
of Reading, Berkeley Unified School District, 1720 Oregon
Street, Berkeley, California, 94703.

ABSTRACT

A STUDY OF THE READABILITY OF READING TEXTBOOKS ADOPTED
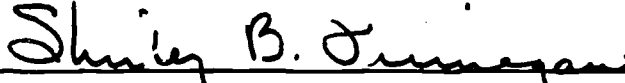FOR USE IN CALIFORNIA ELEMENTARY SCHOOLS

By

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B.S. of Elem. Ed. Oregon College of Education, 1955
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The Requirements for the Degree of
Doctor of Philosophy

Walden University
July, 1974

The Problem

New textbooks in reading were adopted for use in California elementary schools beginning with the 1969-70 school year. Three collections of textbooks were adopted for culturally disadvantaged, slow, average, and fast student groups. The vocabulary in the collections had been studied and described in subjective, rather than objective terms. No readability data had been secured by means of formula application. Therefore, the purpose of this study was to determine if there was a significant difference in the readability of reading textbooks adopted for four student groups.

Methods and Procedures

The Botel readability formula, contained in _Predicting Reading Levels_, was applied to nine, 100-word samples taken from a total of twenty-four textbooks. The sign test for significant differences was applied in an inter-textbook comparison of readability levels of each of the nine samples across the three collections. The data were inspected, further, to determine intra-textbook variations in readability levels among the nine samples.

The interquartile range $(Q_3 - Q_1)$ was calculated for each of the nine, 100-word samples taken from the twenty-four textbooks. The data were inspected to determine if there was a difference in the _range_ of readability levels of

the textbooks in a comparison among the three collections.

The sign test for significant differences was applied, a
second time, in an inter-textbook comparison of the inter-
quartile ranges.

Findings

Readability levels of textbooks, adopted for cultu-
rally disadvantaged students, were significantly lower than
readability levels of textbooks adopted for slow and average
students in grades one, two, and three, in three of the five
comparisons made.

Readability levels of textbooks, adopted for slow
and average students, were significantly higher than text-
books adopted for fast students in grades one, two, and
three, in two of the five comparisons made.

The readability level of the fifth-grade textbook,
adopted for culturally disadvantaged and slow students, was
significantly lower than the readability level of the text-
book adopted for the fast students.

Textbooks, adopted for fast students, achieved the
best publisher's grade assignment--readability level, match.
Additional variations in readability levels were observed
within the nine samples in each of the twenty-four textbooks.

The interquartile range of the nine samples increased
appreciably, starting at the third reader, part two level,

but no significant differences were obtained in interquartile

ranges when comparisons were made among the three collections.